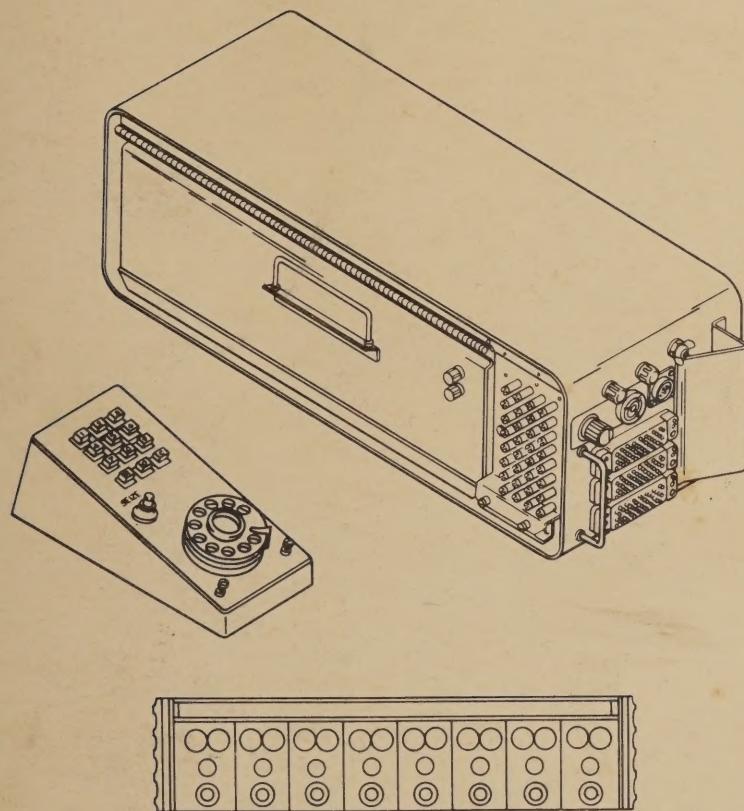


TM 11-5805-553-13  
EE165-BB-OMI-010  
E154CV1918,A

OPERATOR'S, ORGANIZATIONAL AND DIRECT  
SUPPORT MAINTENANCE MANUAL



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CONVERTER, TELEPHONE SIGNAL  
CV-1918A(V)1/G (NSN 5805-00-504-9103)  
CV-1918A(V)2/G (NSN 5805-00-504-9107)  
CV-1918A(V)3/G (NSN 5805-00-137-7674)

DEPARTMENTS OF THE ARMY AND NAVY

5 MARCH 1984



WARNING

THREE-GROUNDED-OUTLET

**5**

## SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

**1**

**DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL**

**2**

**IF POSSIBLE, TURN OFF THE ELECTRICAL POWER**

**3**

**IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL**

**4**

**SEND FOR HELP AS SOON AS POSSIBLE**

**5**

**AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION**

For Artificial Respiration, refer to FM 21-21.

**WARNING**

**TRICHLOROTRIFLUOROETHANE**

Fumes of TRICHLOROTRIFLUOROETHANE are poisonous. Provide adequate ventilation whenever you use TRICHLOROTRIFLUOROETHANE. Do not use solvent near heat or open flame. TRICHLOROTRIFLUOROETHANE will not burn, but heat changes the gas into poisonous, irritating fumes. DO NOT breathe the fumes or vapors. TRICHLOROTRIFLUOROETHANE dissolves natural skin oils. DO NOT get the solvent on your skin. Use gloves, sleeves and an apron which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

**WARNING**

**DO NOT SERVICE OR ADJUST ALONE**

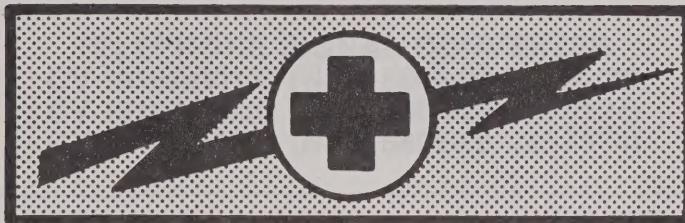
Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

**SAFETY PRECAUTION**

A periodic review of safety precautions in TB 385-4, Safety Precautions for Maintenance of Electrical/Electronic Equipment, is recommended. When the equipment is operated with covers removed, DO NOT TOUCH exposed connections or components. MAKE CERTAIN you are not grounded when making connections or adjusting components inside the test instrument.

TECHNICAL MANUAL  
NO. 11-5805-553-13  
EQUIPMENT MAINTENANCE

## WARNING



## WARNING

### HIGH VOLTAGE

IS USED IN THE OPERATION OF THIS EQUIPMENT

### DEATH ON CONTACT

MAY RESULT IF PERSONNEL FAIL TO OBSERVE SAFETY PRECAUTIONS

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections of 115 volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

**WARNING** Do not be misled by the term "low voltage". Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.



## TECHNICAL MANUAL

No. 11-5805-553-13

EE165-BB-OMI-010/E154CV1918, A

DEPARTMENTS OF THE ARMY AND NAVY

Washington, DC, 5 March 1984

OPERATOR'S, ORGANIZATIONAL, and  
DIRECT SUPPORT MAINTENANCE MANUAL

## TELEPHONE SIGNAL CONVERTER

CV-1918A(V)1/G (NSN 5805-00-504-9103)

CV-1918A(V)2/G (NSN 5805-00-504-9107)

CV-1918A(V)3/G (NSN 5805-00-137-7674)

## REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. For Navy, submit comments on OPNAV 4790/66 (Technical Publications Deficiency Report) to the Commander, Naval Air Technical Services Facility, ATTN: Code 41, 700 Robbins Avenue, Philadelphia, Pennsylvania 19111. In either case, a reply will be furnished direct to you.

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\*This manual supersedes so much of TM 11-5805-553-12, 29 January 1975 and TM 11-5805-553-34, 3 February 1975, including all changes as pertains to operator's, organizational, direct support and general support maintenance.

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### HOW TO USE THIS MANUAL

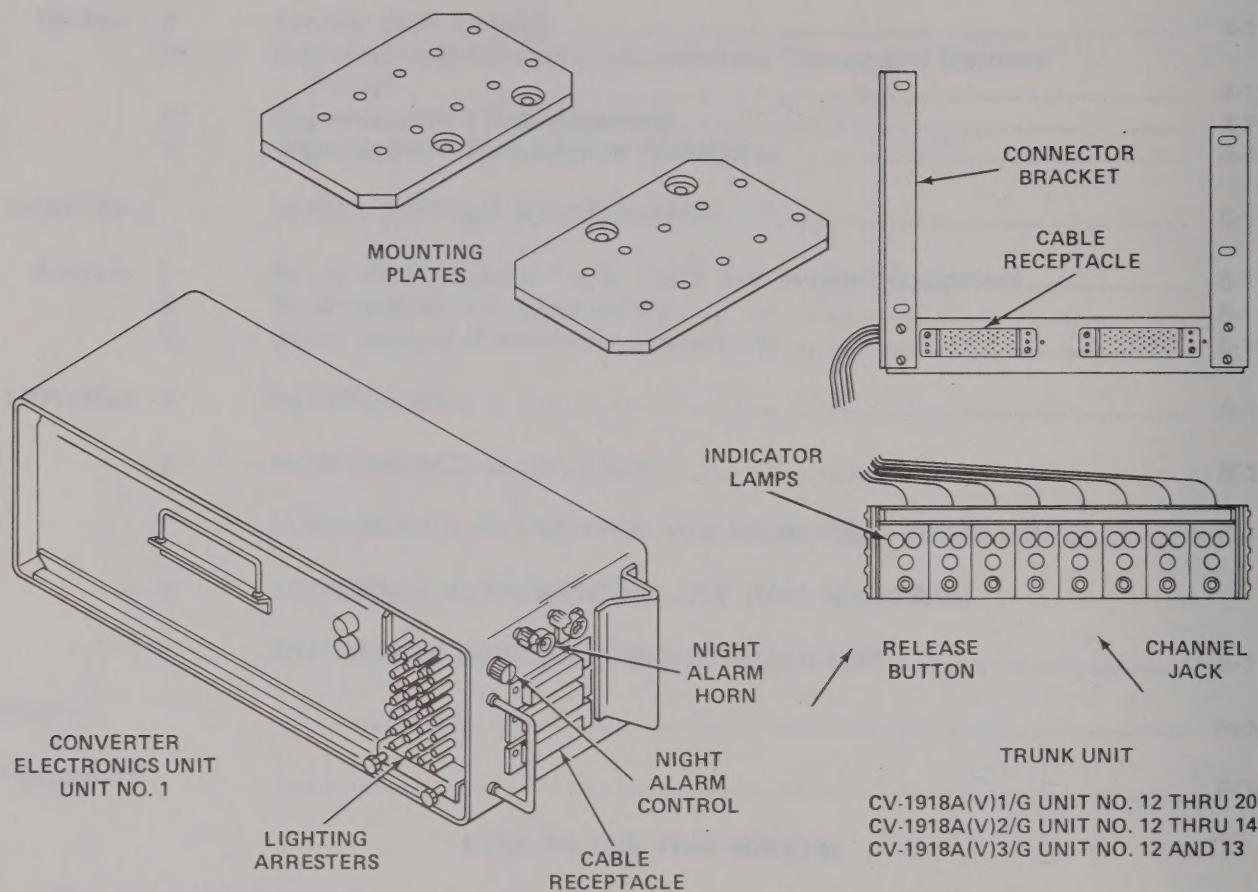
This manual is designed to help you operate and maintain the Telephone Signal Converter CV-1918A(V)\*/G. The front cover table of contents is provided for quick reference to important information. There is also an index located in the final pages for use in locating specific items of information.

Warning pages are located in the front of this manual. You should learn the warnings before operating or doing maintenance on the equipment.

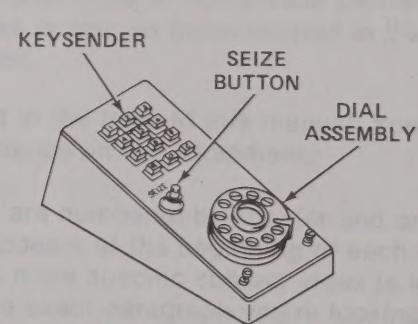
Paragraphs in this manual are numbered by chapter and order of appearance within a chapter. A subject index appears at the beginning of each chapter listing sections that are included in that chapter. A more specific subject index is located at the beginning of each section to help you find the exact paragraph you're looking for.

Read all preliminary information found at the beginning of each task. It has important information and safety instructions you must follow before beginning the task.





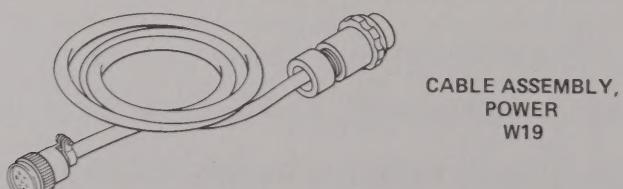
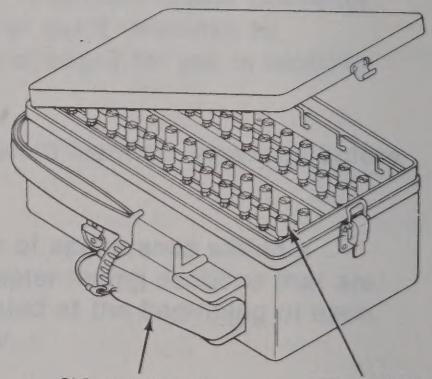
CV-1918A(V)1/G UNIT NO. 12 THRU 20  
CV-1918A(V)2/G UNIT NO. 12 THRU 14  
CV-1918A(V)3/G UNIT NO. 12 AND 13



CABLE ASSEMBLY,  
SPECIAL PURPOSE,  
ELECTRICAL CX-2584/U

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CV-1918A(V)3/G-W1 THRU W4

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EL1RD000

# CHAPTER 1

## INTRODUCTION

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### Section I GENERAL INFORMATION

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Consolidated Index of Army Publications and Blank Forms .....	1-2	1-1
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#### **1-1. SCOPE.**

Type of Manual: Operator's, organizational, and direct support maintenance.

Equipment Name and Model Numbers: Telephone Signal Converter CV-1918A(V)1/G, CV-1918A(V)2/G and CV-1918A(V)3/G.

Purpose of Equipment: Provides a means of interfacing between manual and automatic telephone central offices.

#### **1-2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS.**

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications concerning the equipment.

#### **1-3. MAINTENANCE FORMS, RECORDS AND REPORTS.**

#### **REPORTS OF MAINTENANCE AND UNSATISFACTORY EQUIPMENT**

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update. Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) IAW OPNAVINST 4790.2, Vol 3 and unsatisfactory material/conditions (UR submissions) IAW OPNAVINST 4790.2, Vol 2, chapter 17.

#### **REPORT OF PACKAGING AND HANDLING DEFICIENCIES**

Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

**1-3. MAINTENANCE FORMS, RECORDS AND REPORTS. (CONT)****DISCREPANCY IN SHIPMENT REPORT (DISREP) (SF 361)**

Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

**1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.**

Destruction of Army materiel to prevent enemy use shall be in accordance with TM 750-244-2.

**1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).**

If your CV-1918 needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey, 07703. We'll send you a reply.

Navy personnel are encouraged to submit EIR's through their local Beneficial Suggestion Program.

**1-6. NOMENCLATURE CROSS-REFERENCE LIST.**

This list contains common names used in place of official nomenclature in this manual.

COMMON NAME	OFFICIAL NOMENCLATURE
automatic CO CV-1918	AN/TTC-38 (V) * Automatic Telephone Central Office Converter, Telephone Signal, CV-1918A(V)1/G, CV-1918A(V)2/G, CV-1918A(V)3/G
switchboard	SB-249/TTC or SB-1398/GTA-14(V) Manual Telephone Switchboard
switchboard facility	AN/MTC-1 or AN/MTC-9 Manual Telephone Central Office

**1-7. LIST OF ABBREVIATIONS.**

This list contains abbreviations used throughout this manual.

ABBREVIATION	WORD OR TERM
BY	Busy
CB-LB	Common Battery - Local Battery
CO	Central Office
DTMF	Dual-Tone Multifrequency
MDF	Main Distribution Frame
PCB	Printed Circuit Board
SR	Service Request

## Section II EQUIPMENT DESCRIPTION

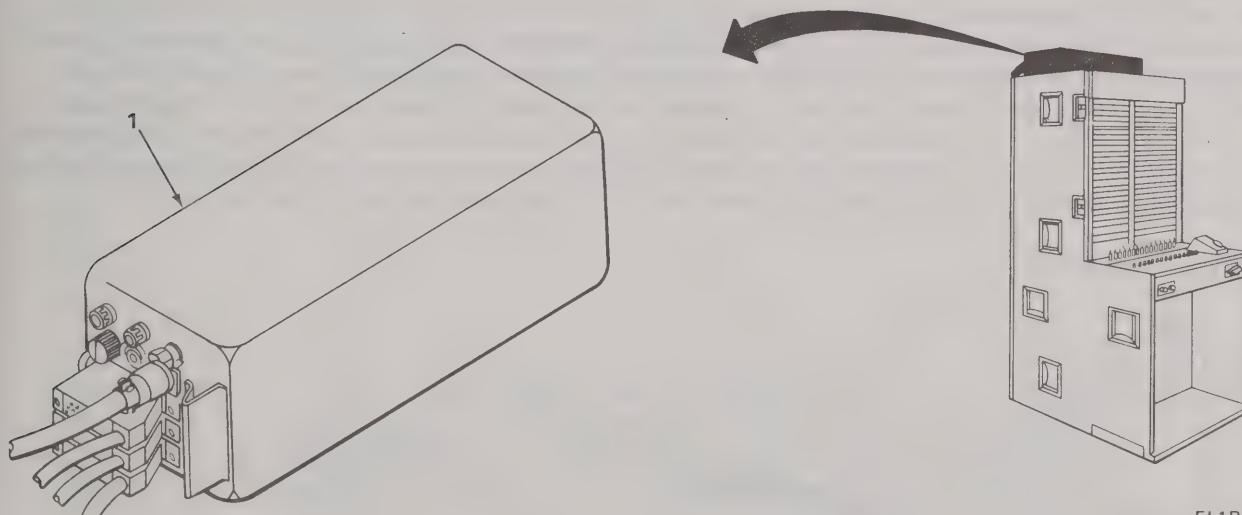
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Differences Between Models .....	1-10	1-6
Equipment Data.....	1-11	1-6

### 1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

The CV-1918 is a transistorized, eight-channel telephone signal converter designed to interface between automatic and manual telephone central offices. When installed on either the SB-249 TT/C or SB-1398/GTA-14(V) switchboard, the CV-1918 provides two-wire to four-wire and four-wire to two-wire telephone signal compatibility. In addition to establishing a voice path between the two different types of telephones, the CV-1918 generates the tones required to activate the automatic telephone central office switching functions. With the CV-1918, the manual switchboard operator can dial into the automatic telephone central office using the DTMF dialing capability.

### 1-9. DESCRIPTION OF MAJOR COMPONENTS.

#### ELECTRONICS UNIT

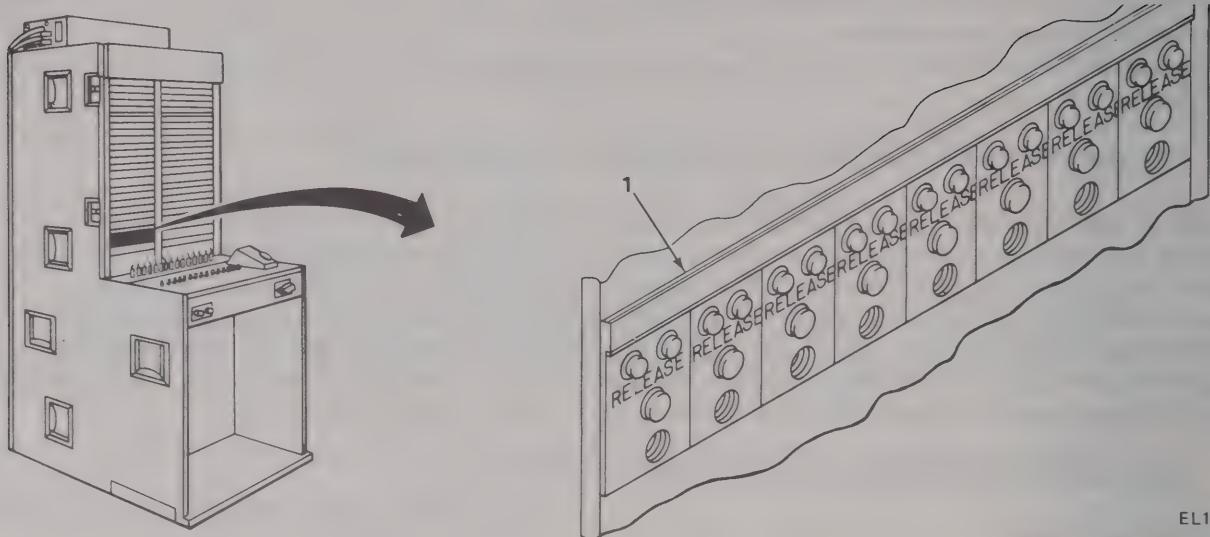


EL1RD001

The electronics unit (1) is mounted on top of the switchboard in the first operator position. The electronics unit contains the lightning arresters, fuses, night alarm, receptacles for necessary signal and power cabling, and most of the CV-1918 electronics. All signals to and from the automatic telephone central office are routed through this unit.

## 1-9. DESCRIPTION OF MAJOR COMPONENTS. (CONT)

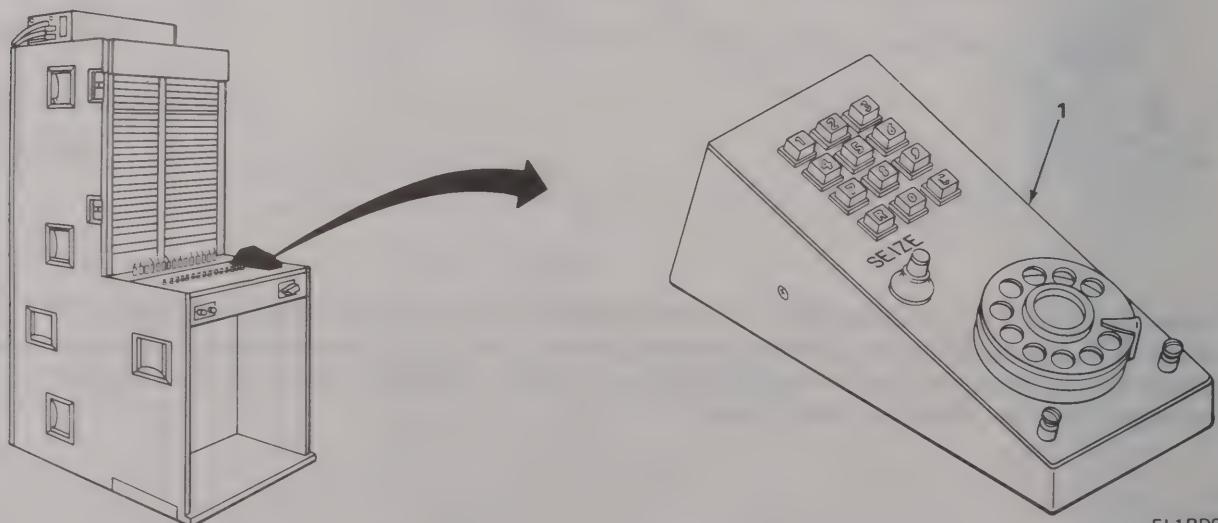
## TRUNK UNIT



EL1RD002

The trunk unit (1) is installed on the left-hand side of the switchboard directly above the magneto supervisory lamps. The trunk unit is divided into eight segments; each segment corresponds to one of the eight telephone channels running between the switchboard facility and the automatic central office. The channel jack in each segment provides the operator with access to the corresponding channel. In addition, each segment has two indicator lamps and a button. The indicator lamps enable the operator to monitor the status of the channel. The button provides control of the central office line and permits the switchboard operator to break the connection when a call is completed.

## KEYCALL PEDESTAL

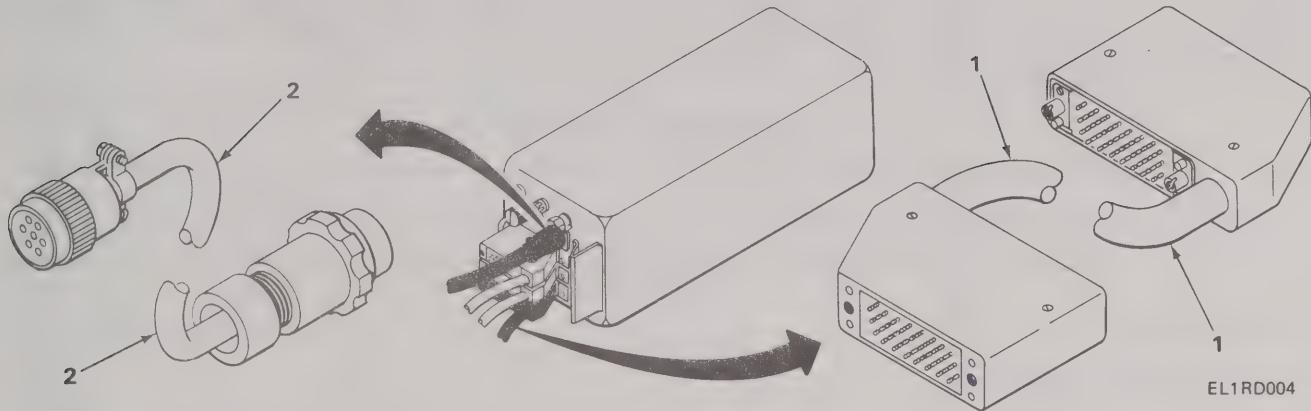


EL1RD003

The keycall pedestal (1) is mounted on the right-hand side of the switchboard keyshelf. It interfaces both mechanically and electrically with the operator's console. Using the keysender buttons, the operator can direct-dial into the automatic central office. To dial another manual facility, the operator uses the rotary dial assembly.

## 1-9. DESCRIPTION OF MAJOR COMPONENTS. (CONT)

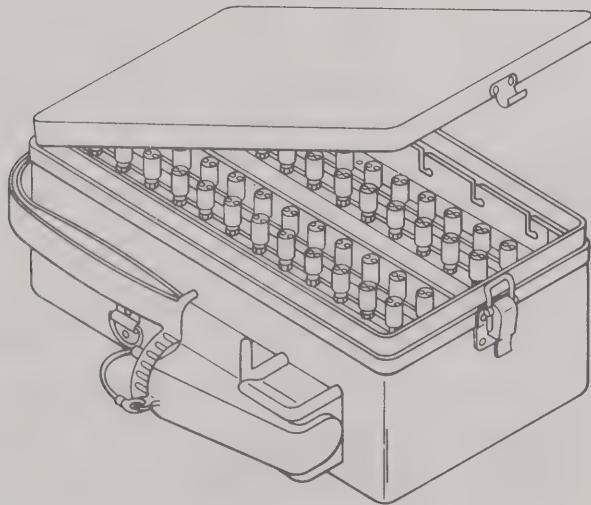
## CABLE ASSEMBLIES



The separate components of the CV-1918 are interconnected with Special-Purpose Electrical Cable Assemblies CX-2584/U (1). These cables are equipped with two-way, interlocking 26-pair connectors. These cable connectors may be used individually or stacked when connecting equipment in parallel. The CX-2584/U signal cables supplied with the CX-1918 are each 8 ft, 7 in. (2.65 m) long.

The power cable (2) supplied with the CV-1918 is equipped with two different connectors. The eight-contact, female connector plugs into the CV-1918 electronics unit. The connector on the other end plugs into a spare, -48 vdc power receptacle. This receptacle is located on the bottom rear of the switchboard.

## DISTRIBUTION BOX



EL1RD005

Every CV-1918 comes equipped with one J-1077 (\*)/U distribution box. The distribution box is not used in every CV-1918 installation. This equipment is provided to add flexibility in different tactical situations when additional telephone inputs are required.

## 1-10. DIFFERENCES BETWEEN MODELS.

There are three different models of the CV-1918: the CV-1918A(V)1/G, the CV-1918A(V)2/G, and the CV-1918A(V)3/G. The CV-1918 is designed to be used with manual telephone central office facilities that contain either two, three or nine switchboards. The three CV-1918 models differ only in the quantities of components used in their configuration. The following table identifies each CV-1918 model by listing component quantities according to model number.

CV-1918 COMPONENT QUANTITIES

SYSTEM COMPONENTS	CV-1918A(V)1/G	CV-1918A(V)2/G	CV-1918A(V)3/G
Electronics Unit	1	1	1
Universal Mounting Plate	2	2	2
Trunk Unit	9	3	2
Keycall Pedestal	9	3	2
Distribution Box	1	1	1
CX-2584/U Signal Cable	18	6	4
Power Cable	1	1	1

The CV-1918A(V)1/G is designed for installation in the AN/MTC-9. The CV-1918A(V)2/G is installed in the AN/MTC-1.

## 1-11. EQUIPMENT DATA.

Circuit capacity	8 channel
Transmission range	2 miles (3.218 km)
Transmission loss	5 db maximum
Transmission line impedance	600 ohms
Voice frequency range	300 to 3500 Hz
Input signal frequency:	
Release	2600 Hz
Seize	2250 Hz
Acknowledge	570 Hz
Input signal levels	-30 dbm
Crosstalk attenuation	50 db minimum
Operating power:	
Internal (regulated)	-6 and -3 vdc
External	-48 vdc

## -11. EQUIPMENT DATA. (CONT)

Operating temperature	0° to + 125°F (-17.7 to 51.7°C)
Storage temperature	-70° to + 160°F (-56.7 to 71.1°C)
Relative humidity:	
Up to + 85°F (29.5°C)	100 percent
+ 85° to + 120°F (29.5° to 48.9°C)	85°F (29.5 °C) dewpoint
Above + 120°F (48.9°C)	5 percent
Operating altitude above sea level	Up to 10,000 ft (3000 m)
Storage altitude above sea level	Up to 50,000 ft (15,000 m)
Converter output frequencies ± 1/3 percent:	
Release	2600 Hz (3 to 10 seconds maximum duration)
Seize	2250 Hz
Acknowledge	570 Hz
Ringback	425 Hz (interrupted)
DTMF keysend signals:	
1	697 + 1209 Hz
2	697 + 1336 Hz
3	697 + 1477 Hz
4	770 + 1209 Hz
5	770 + 1336 Hz
6	770 + 1477 Hz
7	852 + 1209 Hz
8	852 + 1336 Hz
9	852 + 1477 Hz
0	941 + 1209 Hz
C	941 + 1336 Hz
R	941 + 1477 Hz

## WEIGHTS AND DIMENSIONS

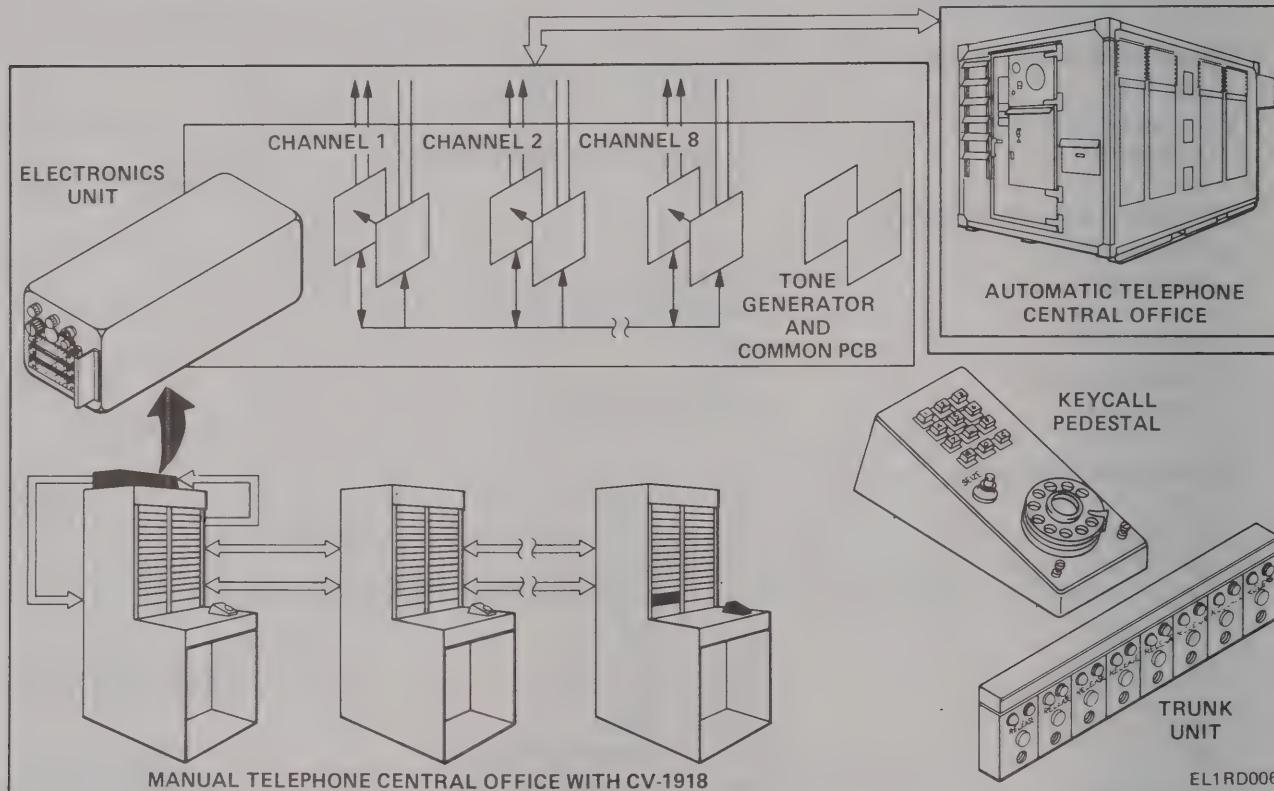
EQUIPMENT	DIMENSIONS (in./cm)			
	HEIGHT	DEPTH	WIDTH	WEIGHT (lb/kg)
Electronics Unit	8.5/21.59	27/68.58	9.75/24.76	40/18.16
Trunk Unit	2.5/6.35	12/30.48	11/27.94	4.5/2.04
Keycall Pedestal	3.25/8.25	8.875/22.54	3.375/8.57	2.5/1.13
Distribution Box	5.5/13.97	15/38.1	15/38.1	15/6.81
Mounting Plate	1.5/3.81	8.26/20.98	5.5/13.97	2/.90

Each CX-2584/U signal cable is 8.58 ft (2.61 m) long and weighs 2.5 lb (1.13 kg). The power cable is 50 ft (15.25 m) long and weighs 5 lb (2.26 kg).

### Section III PRINCIPLES OF OPERATION

Subject	Para	Page
System Principles of Operation .....	1-12	1-8
Component Principles of Operation .....	1-13	1-10

#### 1-12. SYSTEM PRINCIPLES OF OPERATION.



The CV-1918 and the automatic telephone central office (CO) communicate with each other through the use of electronic signal tones. These tones are generated at specific frequencies and are sent and received over the telephone wire signal pairs. These signal pairs connect the switchboards of the manual CO to the automatic CO. Each command is represented by a different frequency signal tone.

The CV-1918 translates the operator's actions into signal tone commands. These tones are generated in either the keycall pedestal or electronics unit and then relayed to the automatic CO. The automatic CO acknowledges the command with a return tone and then performs the function required by the operator.

Some of these signal tones, such as the seize tone and the DTMF keying tones, can be heard in the headset. In the description of the CV-1918 operations which follows, the specific signal tones are not mentioned unless they can be heard by the operator.

## 1-12. SYSTEM PRINCIPLES OF OPERATION. (CONT)

### INCOMING CALL FROM AUTOMATIC CO

When a call comes into the CV-1918 on one of the eight automatic CO channels, the SR indicator lamp corresponding to that channel will light at every operator position trunk unit. The night alarm horn will sound if the NIGHT ALARM has been set. At the same time, the electronics unit returns ringback tone to the four-wire telephone originating the call.

When an operator answers the service request by plugging an answer cord into the appropriate channel jack, the NIGHT ALARM, SR indicator lamp and ringback tone are switched off. A voice path is established between the switchboard operator and the four-wire telephone user. The BY indicator lamps associated with the channel in use will light at every operator position trunk unit.

When the conversation is finished and the four-wire telephone goes on-hook, the SR indicator lamp lights again. The switchboard operator removes the answer cord from the channel jack, and the SR and BY indicator lamps are switched off.

### OUTGOING CALLS TO THE AUTOMATIC CO

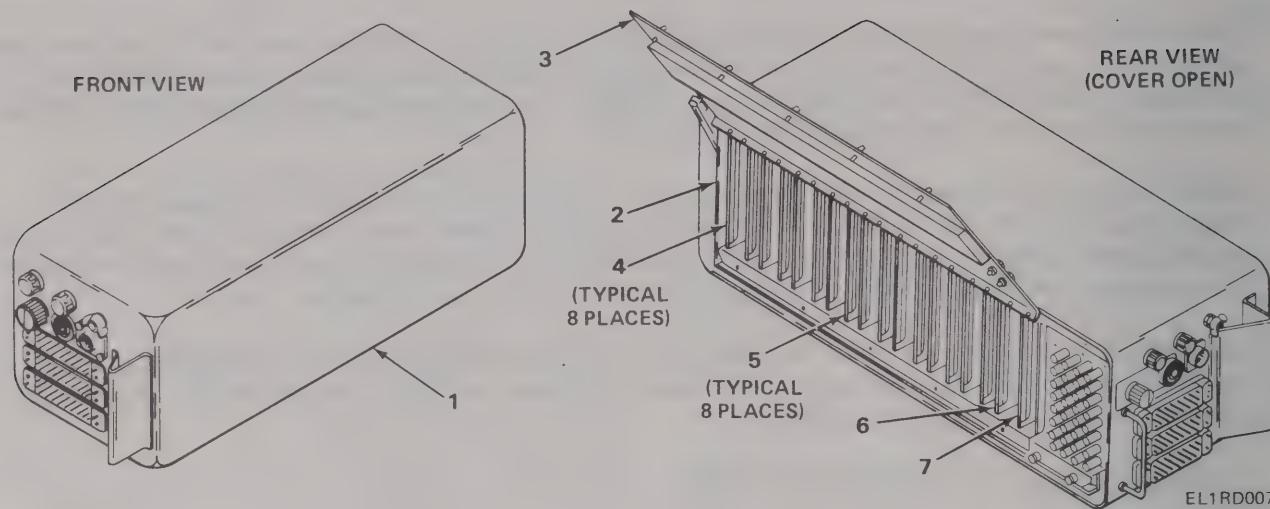
To dial into the automatic CO from a CV-1918-equipped switchboard, the operator selects an unused channel on the trunk unit and plugs a call cord into the channel jack. When the operator presses the SEIZE button, the electronics unit sends a signal tone to the automatic CO requesting a line. In response to this tone, the automatic CO returns dial tone to the operator.

The operator dials the necessary digits using the keycall pedestal keysender. The keycall pedestal generates a specific pair of tones for each different digit as the button is pressed. These tones are sent through the electronics unit to the automatic CO which decodes the tones and dials the appropriate digits. When the four-wire telephone goes off-hook, the connection is completed.

When the conversation is finished, the switchboard operator presses the trunk unit RELEASE button corresponding to the channel in use. The operator then removes the call cord from the channel jack which restores the channel to idle. The electronics unit signals the CO to break the connection and the BY indicator lamp is switched off.

## 1-13. COMPONENT PRINCIPLES OF OPERATION.

## ELECTRONICS UNIT



The electronics unit (1) contains the majority of the CV-1918 circuitry in the form of 18 printed circuit boards. These PCB's are enclosed in a card cage (2) accessible through the hinged cover (3) on the back of the unit.

The PCB's include the following:

Eight Analog Printed Wiring Assemblies designated 1A1A1 through 1A8A1 (4).

Eight Logic Printed Wiring Assemblies designated 1A1A2 through 1A8A2 (5).

One Tone Generator Printed Wiring Assembly 1A9 (6).

One Common Printed Wiring Assembly 1A10 (7).

A pair of PCB's, made up of one analog PCB and one logic PCB, is assigned to each of the eight channels.

The analog PCB contains the circuitry to detect the tone signals sent by the automatic CO on the four-wire channel receive pair. When a seize, acknowledge, or release tone is detected, the analog PCB outputs a signal to the logic PCB to generate the correct response. The logic PCB's contain the circuits that determine which signals are processed at a specific time. If the input from the analog PCB indicates a tone signal reply is required, the logic PCB selects the proper tone. The tone originates on the tone generator and is sent out on the four-wire telephone send pair. The logic PCB also responds to signal inputs from the operator's controls on the switchboard, trunk unit, and keycall pedestal. The proper combination of signal inputs will cause the logic PCB to send seize tone or release tone to the automatic CO. The logic PCB is responsible for switching the associated SR and BY indicator lamps on and off on the trunk unit.

### 1-13. COMPONENT PRINCIPLES OF OPERATION. (CONT)

When a voice path is established between the CV-1918 and the remote automatic CO, the analog PCB receives the incoming audio on the receive pair. The audio signal leaves the logic card on the send pair for return to the automatic CO.

The tone generator PCB has four separate oscillators that operate continuously to provide the necessary signal tones. Each tone must be generated at exactly the proper frequency in order to trigger the desired response from the automatic equipment. The signals and frequencies are as follows:

Acknowledge tone	570 Hz
Seize tone	2250 Hz
Release tone	2600 Hz
Ringback tone	425 Hz

The 425-Hz tone is further modified and interrupted in a 2-second-on, 4-second-off pattern to produce the distinctive ringback signal.

The common PCB contains the CV-1918 voltage regulation and overvoltage protection circuits. The -48 vdc input from the switchboard is divided and regulated on the common PCB to produce -6 and -3 vdc outputs. The -3 vdc output is produced by stepping down a portion of the -6 vdc power. If the -6 vdc output rises above -6.8 vdc, the overvoltage protection circuit shunts the voltage to ground and causes the line fuse to open.

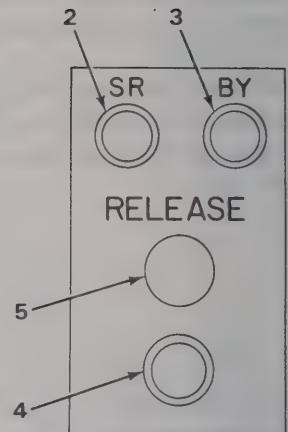
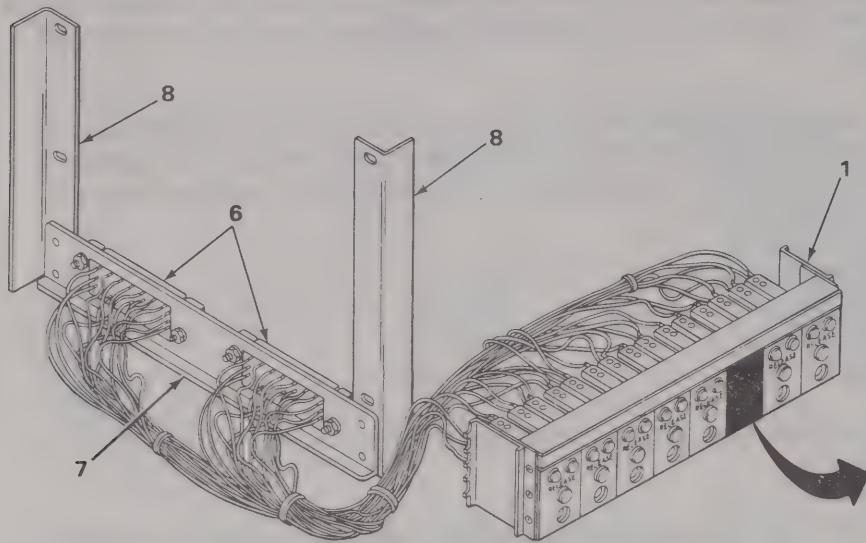
In addition to housing the printed circuit board assemblies, the electronics unit contains the components necessary to protect the equipment from power surges and spikes. The lightning arrester panel, located on the rear of the unit, mounts 32 arresters. Each provides protection for one of the individual telephone wires interconnecting the CV-1918 and the automatic CO. Two line fuse holders are mounted on the side of the unit.

The night alarm, which is made up of an audible signaling device and an on/off/volume control, is housed in the electronics unit. This alarm is tied into the SR indicator lamp circuit and is designed to accompany the visual indicator with an audible signal. This signal is used during low-traffic periods when the switchboard facility may not be fully staffed.

The 26-pair signal cable receptacles and the power receptacle are located on the side of the electronics unit. All signals to and from the automatic CO are routed through these cable receptacles.

## 1-13. COMPONENT PRINCIPLES OF OPERATION. (CONT)

## TRUNK UNIT



EL1RD008

The CV-1918 trunk unit (1) interfaces both mechanically and electrically with the switchboard.

The trunk unit indicator lamps are switched on and off by the logic PCB associated with the channel in use. This switching is done in response to either incoming signal tones, which are detected and relayed by the analog PCB, or to inputs received directly from local operators' controls.

The white SR indicator lamps (2) are switched on by the logic PCB when an incoming seize tone is received from the automatic CO.

The amber BY indicator lamps (3) are switched on when the logic PCB detects that the operator has inserted a plug in the channel jack (4).

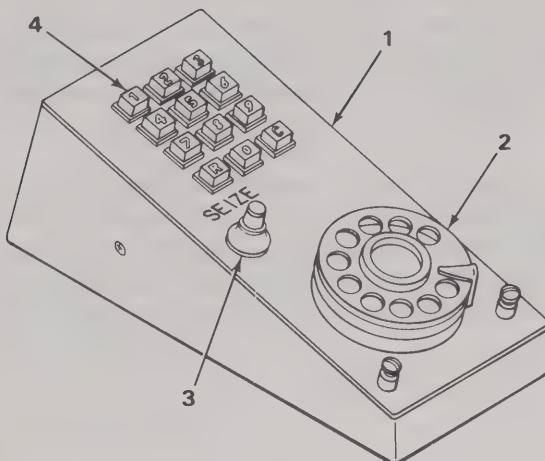
When a trunk unit RELEASE button (5) is pressed, the logic PCB associated with that channel sends a release tone to the automatic CO. This tone originates on the tone generator PCB. The automatic CO then disconnects the line and returns that channel to an idle state.

The DTMF tones generated in the keycall pedestal are sent through the trunk unit channel jacks on the operator's call cord. The tones then go out over the logic PCB circuitry to the automatic CO. When the voice path is established, the incoming audio comes over the analog PCB circuitry and through the channel jack. The outgoing audio goes through the channel jack, over the logic PCB, and out.

All electrical connections to the trunk unit are made through the two 26-pair receptacles (6) mounted inside the switchboard. The connector plate (7) is held in place by two brackets (8). Because the CV-1918 trunk units are interconnected in parallel, the lamping instructions sent from a single-channel logic PCB are duplicated at each operator's position.

## 1-13. COMPONENT PRINCIPLES OF OPERATION. (CONT)

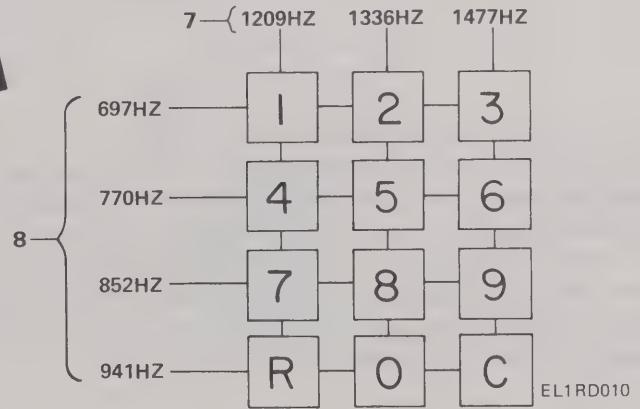
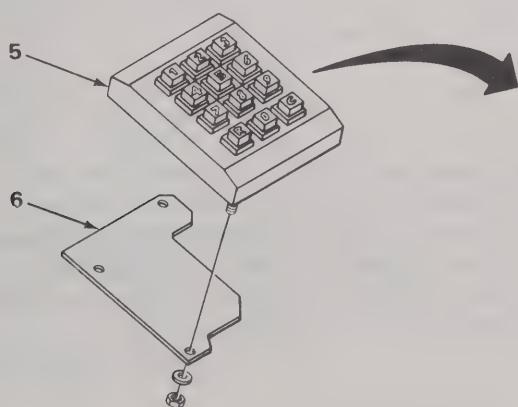
## KEYCALL PEDESTAL



EL1RD009

The keycall pedestal (1) houses the dial assembly (2), a SEIZE button (3), and the keysender and oscillator assembly (4). Although the dial assembly is part of the keycall pedestal unit, it is not involved with the operation of the CV-1918.

When the operator inserts a call cord into a trunk unit channel jack, sets the ring answer - dial switch to the dial position, and presses the SEIZE button (3), a series of inputs are sent to the associated logic PCB. In response to these inputs, the logic PCB sends seize tone over the telephone channel send pair to the automatic CO. The automatic CO returns acknowledge tone to cancel the seize tone, followed immediately by dial tone.



EL1RD010

The keysender and oscillator assembly is made up of two parts: the keysender (5), which contains the 12 pushbuttons; and the DTMF tone oscillator PCB (6), which generates the DTMF tones.

The DTMF tone oscillator PCB generates seven signal tones, each at a different specific frequency. These signals are divided into a high group (7) and a low group (8).

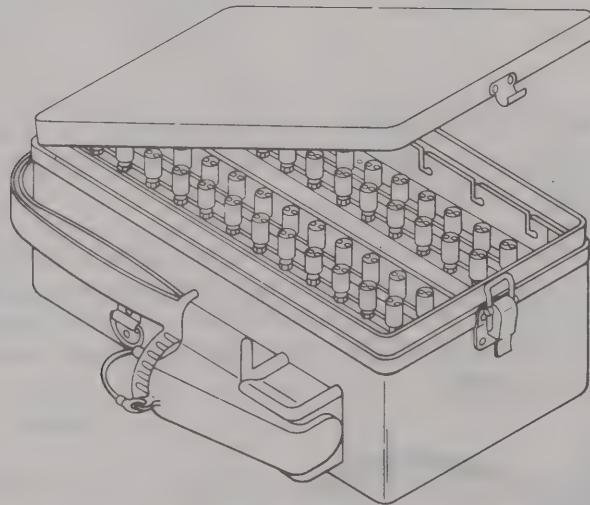
### 1-13. COMPONENT PRINCIPLES OF OPERATION. (CONT)

#### KEYCALL PEDESTAL (CONT)

The DTMF tone oscillator PCB is connected to the keysender in such a way that each tone signal frequency is controlled by a separate switch built into the keysender. Each button on the keysender is connected to a different pair of switches. One switch is dedicated to a tone signal in the high group and the second switch is dedicated to a tone signal in the low group. When the button is pressed, these two paired switches are closed at the same time and the tone signals combine to form the DTMF signal.

The DTMF signal then goes through a ring answer-dial switch and corresponding call cord into the operator-selected trunk unit channel jack. The DTMF signals will be audible in the operator's headset as each digit is keyed on the keysender. The tone signals go across the associated logic PCB, and then out over the telephone channel send pair to the automatic CO. The automatic CO decodes the DTMF signals as they are received and dials the digits represented by these signals.

#### DISTRIBUTION BOX



EL1RD005

The distribution box is designed to be used as a portable, weatherproof junction box. The components of the box include 26 pairs of spring-loaded, field-wire terminals and two receptacles for 26-pair signal cables. The distribution box is wired to provide straight feed-through for 26 signal pairs between the two receptacles. In addition, by using the field-wire terminals, individual telephones can be patched into the cable at the box location. Using the distribution box will permit individual telephone wires to be kept short. Long cable runs can be achieved using the interconnecting 26-pair cables.

## CHAPTER 2

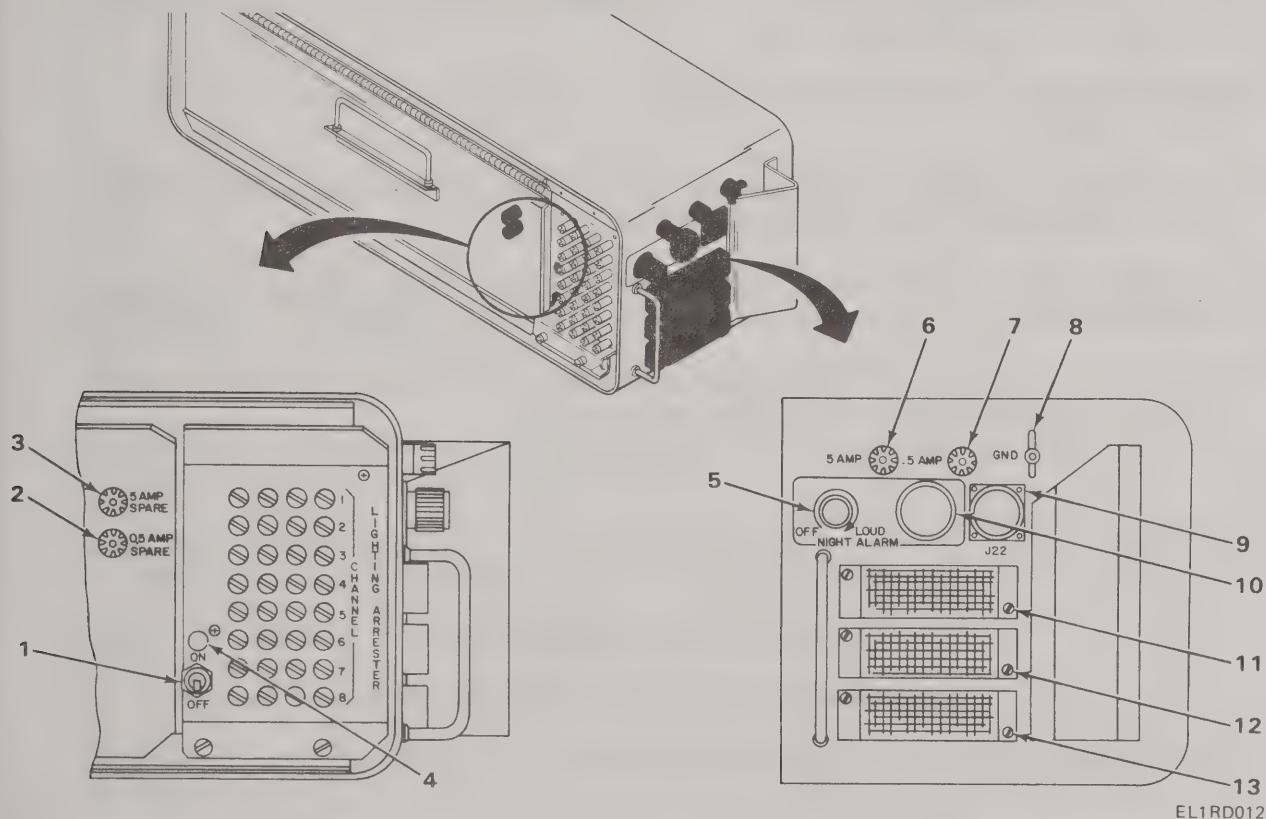
### OPERATING INSTRUCTIONS

Subject	Section	Page
Description and Use of Operator's Controls and Indicators .....	I	2-1
Operator Preventive Maintenance Checks and Services (PMCS) .....	II	2-5
Operation Under Usual Conditions .....	III	2-5
Operation Under Unusual Conditions .....	IV	2-9

#### Section I DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

##### 2-1. DESCRIPTION OF CONTROLS AND INDICATORS.

###### ELECTRONICS UNIT



1 ON-OFF switch. Controls -48 vdc power input to CV-1918.

2 0.5 AMP SPARE fuse holder. Holds one spare 0.5-amp fuse.

3 5.0 AMP SPARE fuse holder. Holds one spare 5.0-amp fuse.

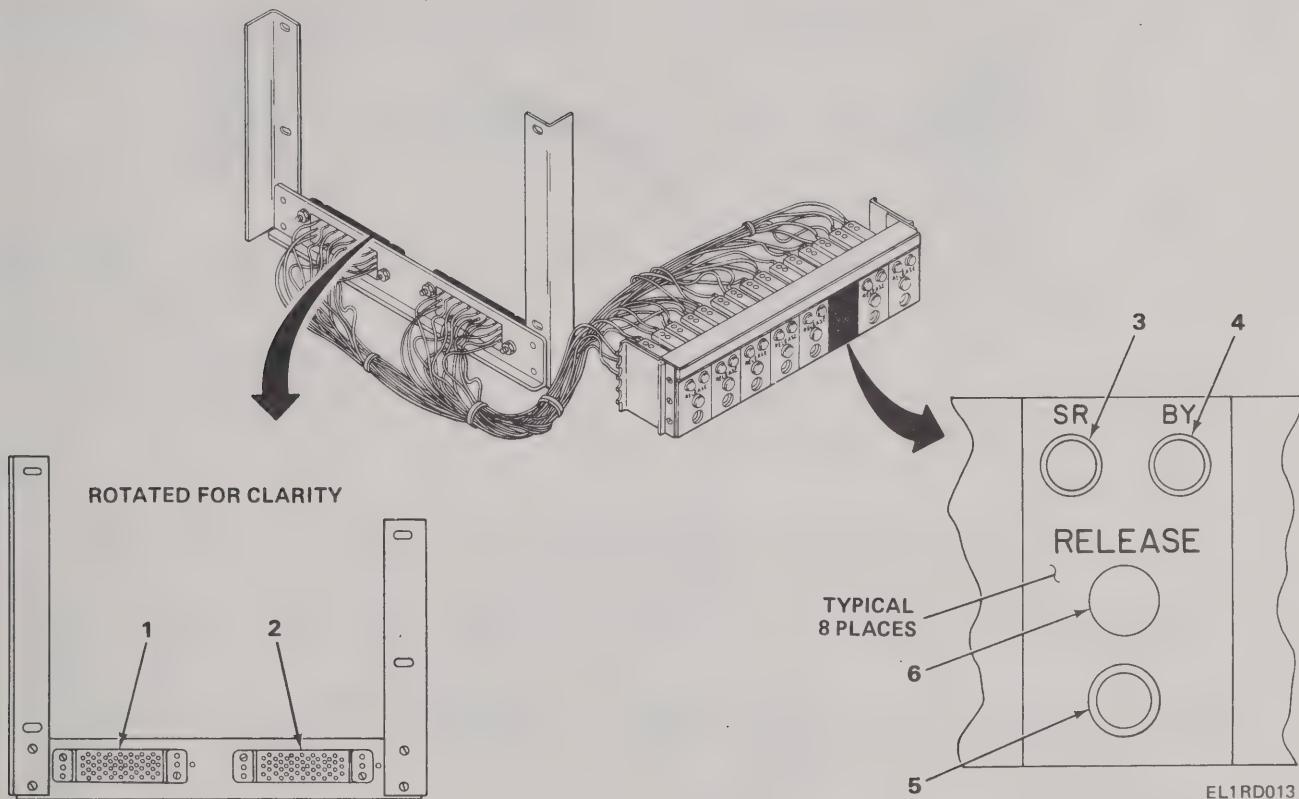
**2-1. DESCRIPTION OF CONTROLS AND INDICATORS. (CONT)**

**ELECTRONICS UNIT (CONT)**

- 4 Indicator lamp. Lights when power is applied to the CV-1918.
- 5 NIGHT ALARM OFF-LOUD control. Turns audible alarm feature on and off and adjusts operating volume level of horn.
- 6 5.0 AMP fuse holder. Holds 5.0-amp line fuse which provides protection for the system communication circuits.
- 7 0.5 AMP fuse holder. Holds 0.5-amp line fuse which provides overvoltage protection for the common PCB and control circuits.
- 8 GND wingnut terminal. Provides connection point for facility ground wire.
- 9 J22 receptacle. Provides connection point on CV-1918 for electrical power cable assembly coming from switchboard power outlet.
- 10 NIGHT ALARM horn. Provides audible indication of a service request on one of the eight CV-1918 channels.
- 11 J21 signal cable receptacle. Provides connection point on CV-1918 for signal cable coming from main distribution frame (MDF) in switchboard facility.
- 12 J20 signal cable receptacle. Provides connection point on CV-1918 for signal cable coming from receptacle J10 on rear of first position switchboard.
- 13 J19 signal cable receptacle. Provides connection point on CV-1918 for signal cable coming from receptacle J9 on rear of first position switchboard.

## 2-1. DESCRIPTION OF CONTROLS AND INDICATORS. (CONT)

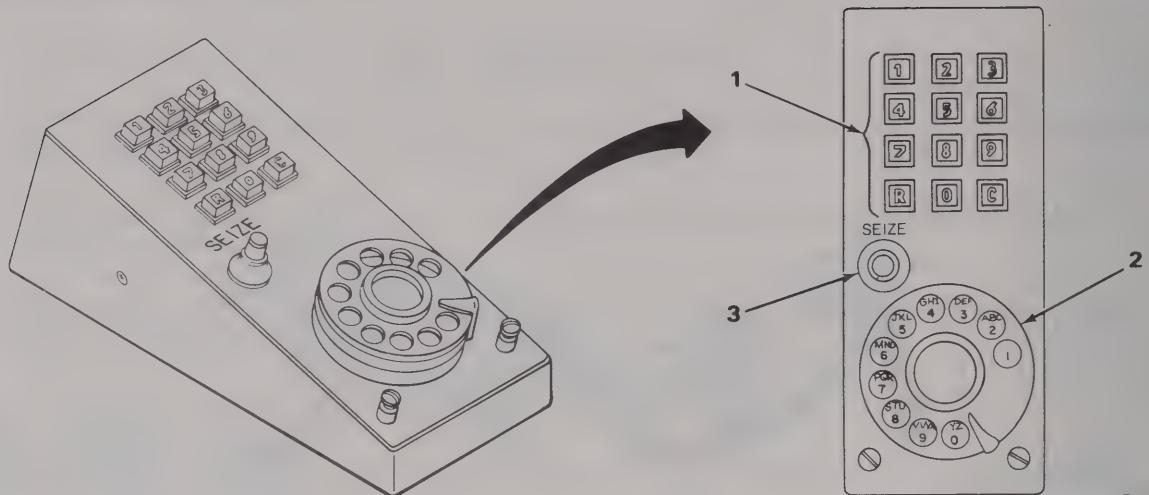
## TRUNK UNIT



- 1 J9 signal cable receptacle. Provides connection point on trunk unit for signal cable coming from receptacle J19 on electronics unit.
- 2 J10 signal cable receptacle. Provides connection point on trunk unit for signal cable coming from receptacle J20 on electronics unit.
- 3 SR indicator lamp. Lights when remote switchboard requests service.
- 4 BY indicator lamp. Lights when associated channel is being used.
- 5 Channel jack. Provides operator with access to telephone channel using switchboard call cord or answer cord.
- 6 RELEASE button. Permits operator to disconnect automatic CO line from corresponding channel.

## 2-1. DESCRIPTION OF CONTROLS AND INDICATORS. (CONT)

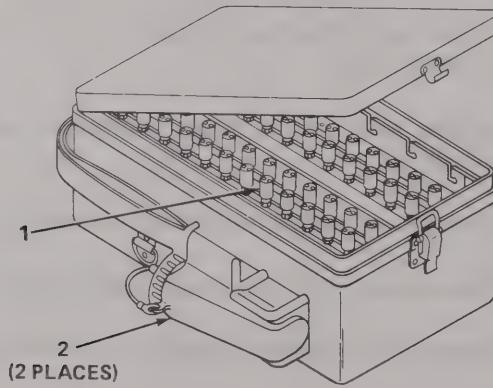
## KEYCALL PEDESTAL



EL1RD014

- 1 Keysender. Sends DTMF signals to automatic CO to dial each digit as buttons are pressed.
- 2 Dial assembly. Sends signals to manual CO to permit operator to dial-access another manual switchboard.
- 3 SEIZE button. Signals automatic CO requesting dial tone on the CV-1918 channel selected by the switchboard operator.

## DISTRIBUTION BOX



EL1RD015

- 1 Field wire terminals. Provide optional termination of 26 two-wire telephones through distribution box to 26-pair cable receptacles.
- 2 Signal cable receptacles. Provide connection points for 26-pair signal cables.

## Section II OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

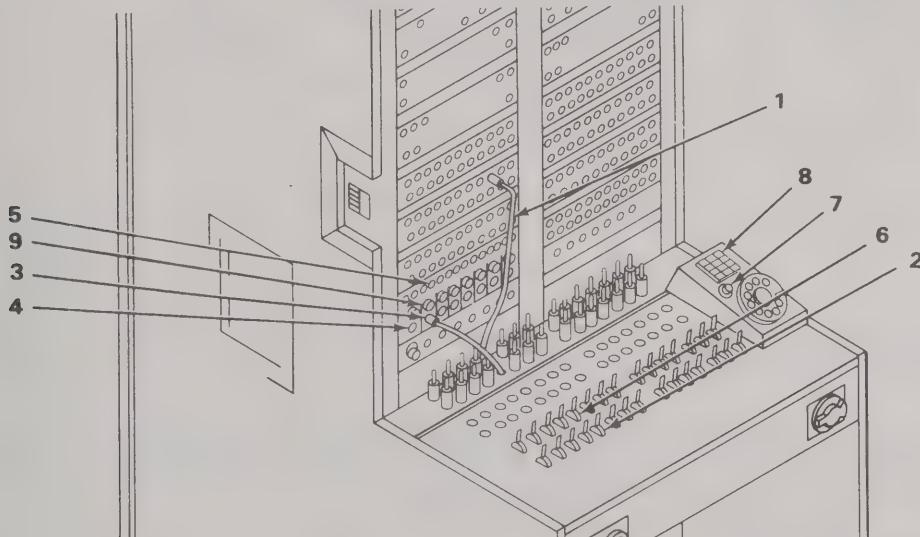
### 2-2. GENERAL.

Operator PMCS is restricted to keeping the equipment clean and verifying operational readiness by performing the installation check in paragraph 2-3.

## Section III OPERATION UNDER USUAL CONDITIONS

Subject	Para	Page
Installation Check.....	2-3	2-5
Operating Procedures .....	2-4	2-6

### 2-3. INSTALLATION CHECK.



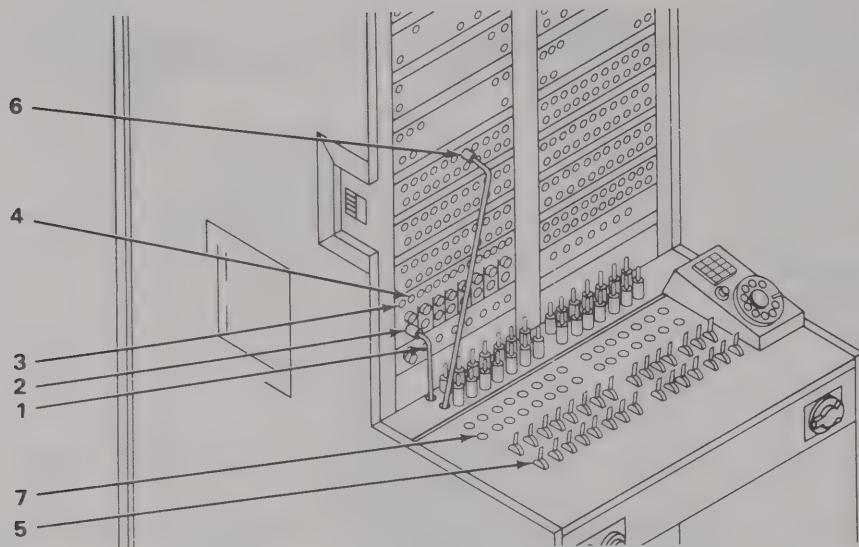
### NOTE

Place an outgoing call for each channel. Only one channel is described.

1. Insert answer cord (1) into any available subscriber line.
2. Set associated ring call/talk switch (2) to talk position.
3. Insert call cord (3) into any available trunk unit channel jack (4) and observe that associated BY indicator lamp (5) lights.
4. Set ring answer/dial switch (6) to dial position.
5. Press SEIZE pushbutton (7) on keycall pedestal (8) and listen for acknowledge tone.
6. Release SEIZE pushbutton (7) and listen for dial tone.
7. Use keycall pedestal (8) and key digits of called party being used in this check.
8. Set ring answer/dial switch (6) to normal position and listen for ringback tone.
9. When ringback tone is heard, return ring call/talk switch (2) to normal.
10. Press RELEASE pushbutton (9) on channel being tested.
11. Return answer cord (1) and call cord (3) to normal position.
12. Repeat procedure for remaining trunk units.

## 2-4. OPERATING PROCEDURES.

## CONNECTING CALL ORIGINATED BY REMOTE SWITCHBOARD



EL1RD026

## NOTE

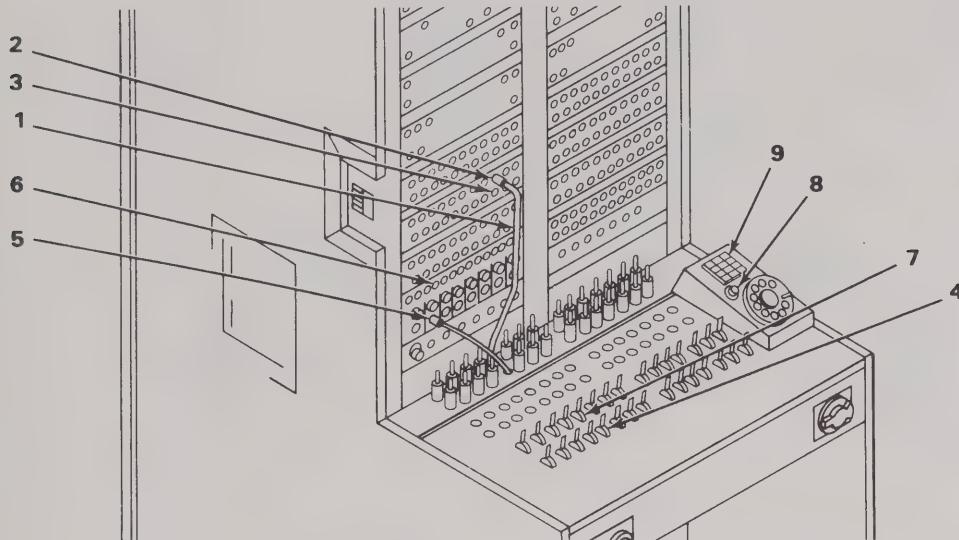
Make sure that CV-1918 power ON-OFF switch is set to ON and associated switchboards are energized. Refer to TM 11-2146.

The following operating instructions do not include operation of the night alarm. Operating instructions are the same when using or not using the night alarm. The only difference will be an audible signal whenever any SR indicator lamp lights.

1. Insert answer cord (1) into trunk unit channel jack (2) associated with glowing SR indicator lamp (3).
2. Observe that SR indicator lamp (3) switches off and BY indicator lamp (4) lights.
3. Set ring call/talk switch (5) to talk position.
4. Determine called party and insert call cord (6) into corresponding subscriber's jack.
5. Observe that associated call supervisory indicator lamp (7) lights.
6. Set ring call/talk switch (5) to ring call position.
7. Observe that when called party goes off-hook, call supervisory indicator lamp (7) switches off.

## 2-4. OPERATING PROCEDURES. (CONT)

## CONNECTING CALL ORIGINATED BY LOCAL SWITCHBOARD

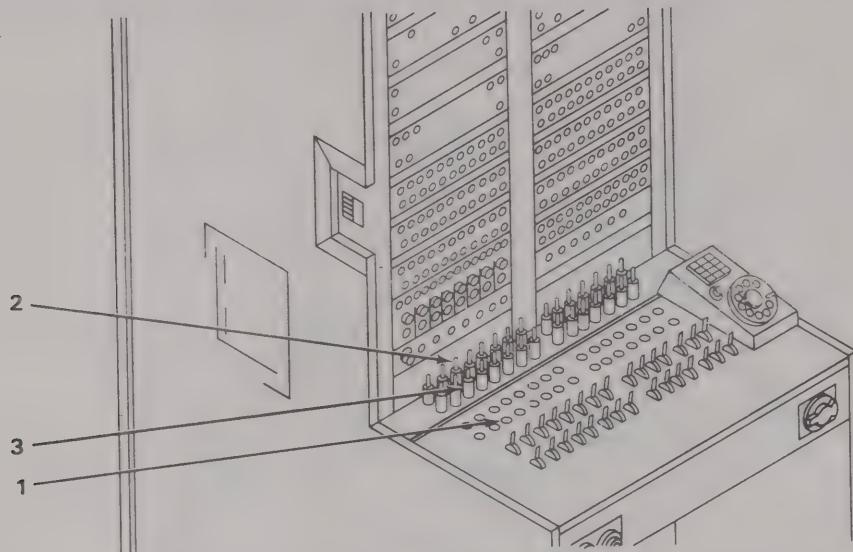


EL1RD027

1. Plug answer cord (1) into calling party line jack (2) above glowing subscriber's indicator lamp (3).
2. Observe that subscriber's indicator lamp (3) is switched off.
3. Set ring call/talk switch (4) to talk position.
4. Determine called party and insert associated call cord (5) into available trunk unit channel jack.
5. Observe that associated BY indicator lamp (6) lights.
6. Set ring answer/dial switch (7) to dial position.
7. Press and release SEIZE pushbutton (8). Listen for dial tone.
8. Using keysender (9), key digits of called party.
9. Set ring answer/dial switch (7) to normal position.
10. Listen for ringback signal and return ring call/talk switch (4) to normal.

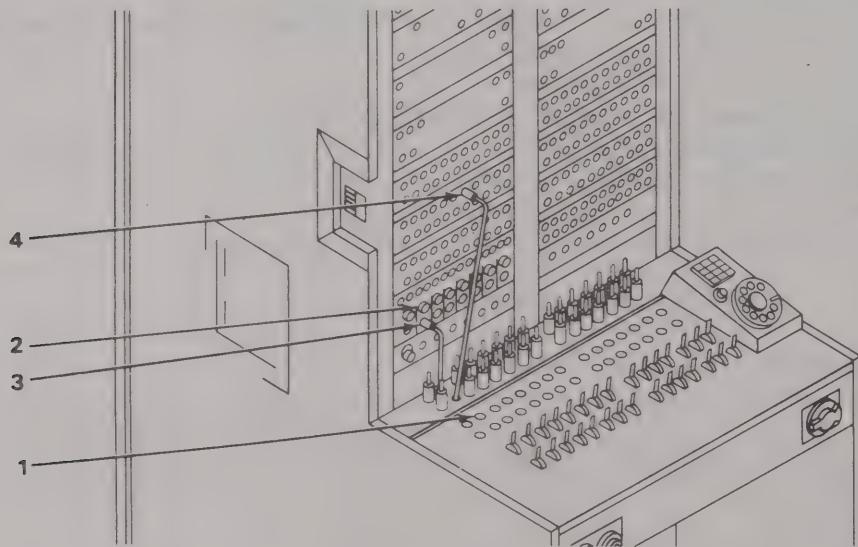
## 2-4. OPERATING PROCEDURES. (CONT)

## DISCONNECTING CALL TERMINATED BY REMOTE SWITCHBOARD



1. When call is terminated, observe that call supervisory indicator lamp (1) lights.
2. Return answer cord (2) and call cord (3) to normal position.

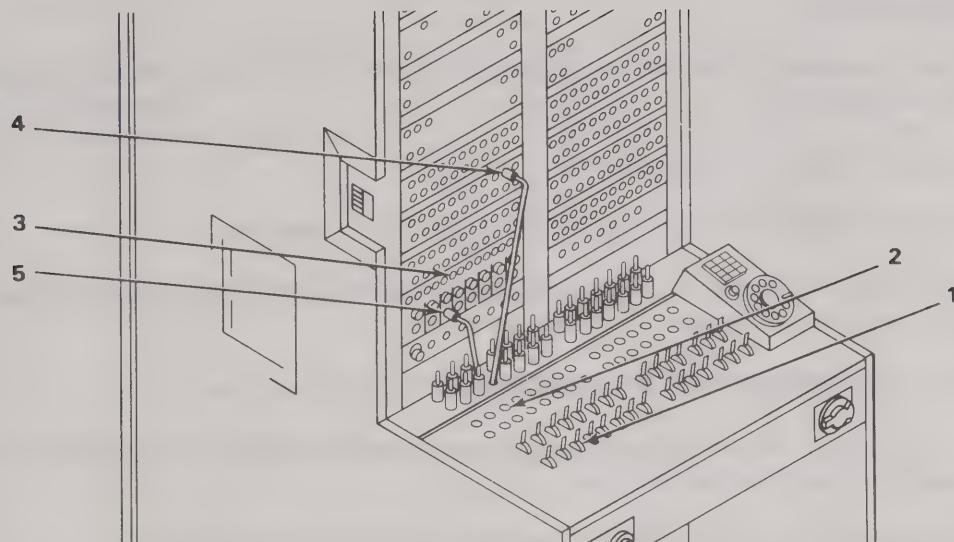
## DISCONNECTING CALL TERMINATED BY LOCAL SWITCHBOARD



1. When call is terminated, observe that answer supervisory indicator lamp (1) lights.
2. Press RELEASE button (2) on trunk unit.
3. Return answer cord (3) and call cord (4) to normal position.

## 2-4. OPERATING PROCEDURES. (CONT)

### PREEMPTING CALLS



EL1RD030

1. Set ring call/talk switch (1) to talk.
2. Observe that answer supervisory indicator lamp (2) and SR indicator lamp (3) light.
3. Return subscriber's call cord (4) to normal position.
4. Pull out and immediately reinsert answer cord (5) into trunk unit jack.
5. Observe that SR indicator lamp (3) and answer supervisory indicator lamp (2) switch off.

## Section IV OPERATION UNDER UNUSUAL CONDITIONS

Section	Para	Page
Operation Under Extreme Environmental Conditions .....	2-5	2-9
Operation Under Emergency Conditions .....	2-6	2-10

## 2-5. OPERATION UNDER EXTREME ENVIRONMENTAL CONDITIONS.

### COLD CLIMATES

Cables become hard, brittle and difficult to handle in extreme cold. When handling cables and connecting cable to equipment, be careful that kinks and unnecessary loops do not result in permanent damage.

Be sure that covers are used on all unused connectors. This will keep snow, frost and ice out of cables. Never drag or place an open connector in the snow.

## 2-5. OPERATION UNDER EXTREME ENVIRONMENTAL CONDITIONS. (CONT)

### HOT CLIMATES

Dirt, sand and dust can damage connectors and receptacles. Put covers on connectors and receptacles when not in use.

Handle cables that have been in the sun with care to avoid damaging the insulation. Repair or replace cables if bare wire is showing.

Never place an open connector on the ground.

### WARM, DAMP CLIMATES

The equipment is subject to damage from moisture and fungi in warm damp climates. Wipe all moisture and fungi from the equipment with a lint-free cloth.

## 2-6. OPERATION UNDER EMERGENCY CONDITIONS.

Some emergency conditions do not require complete shutdown of the CV-1918. Limited operation will result if a channel is lost or DTMF tone is lost.

### CHANNEL FAILURE

Each channel operates independently. A failure of one channel will only result in the loss of the trunk line attached to that channel. When an inoperative channel has a higher priority than an operating channel, the printed circuit board of the inoperative channel can be replaced by a printed circuit board from an operational lower priority channel.

### DTMF TONE OR KEY INOPERATIVE

Failure of a tone or key will still allow completion of calls not requiring those specific faulty digits. If the complete tone circuit fails, calls can still be completed to switchboards capable of operation with dial input.

## CHAPTER 3

### OPERATOR MAINTENANCE

Subject	Section	Page
Lubrication Instructions .....	I	3-1
Operator Troubleshooting .....	II	3-1
Operator Maintenance Procedures .....	III	3-1

#### Section I LUBRICATION INSTRUCTIONS

There are no components of the CV-1918 that require lubrication.

#### Section II OPERATOR TROUBLESHOOTING

There is no troubleshooting authorized at the operator level.

#### Section III OPERATOR MAINTENANCE PROCEDURES

There are no maintenance procedures authorized at the operator level.



## CHAPTER 4

### ORGANIZATIONAL MAINTENANCE

Subject	Section	Page
Repair Parts, Special Tools, TMDE, and Support Equipment .....	I	4-1
Service Upon Receipt .....	II	4-1
Organizational Preventive Maintenance Checks and Services (PMCS).....	III	4-12
Organizational Troubleshooting .....	IV	4-12
Organizational Maintenance Procedures .....	V	4-15

#### **Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT**

Subject	Para	Page
Common Tools and Equipment.....	4-1	4-1
Special Tools, TMDE, and Support Equipment .....	4-2	4-1
Repair Parts .....	4-3	4-1

##### **4-1. COMMON TOOLS AND EQUIPMENT.**

A complete listing of common tools and equipment is given in the Maintenance Allocation Chart (MAC) listed in appendix B at the back of this manual.

##### **4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.**

There are no special tools needed to maintain the CV-1918.

##### **4-3. REPAIR PARTS.**

Repair parts are listed and illustrated in TM 11-5805-553-23P.

#### **Section II SERVICE UPON RECEIPT**

Subject	Para	Page
Unpacking.....	4-4	4-1
Checking Unpacked Equipment .....	4-5	4-3
Installation Instructions.....	4-6	4-3
Preliminary Servicing and Adjustment of Equipment.....	4-7	4-11

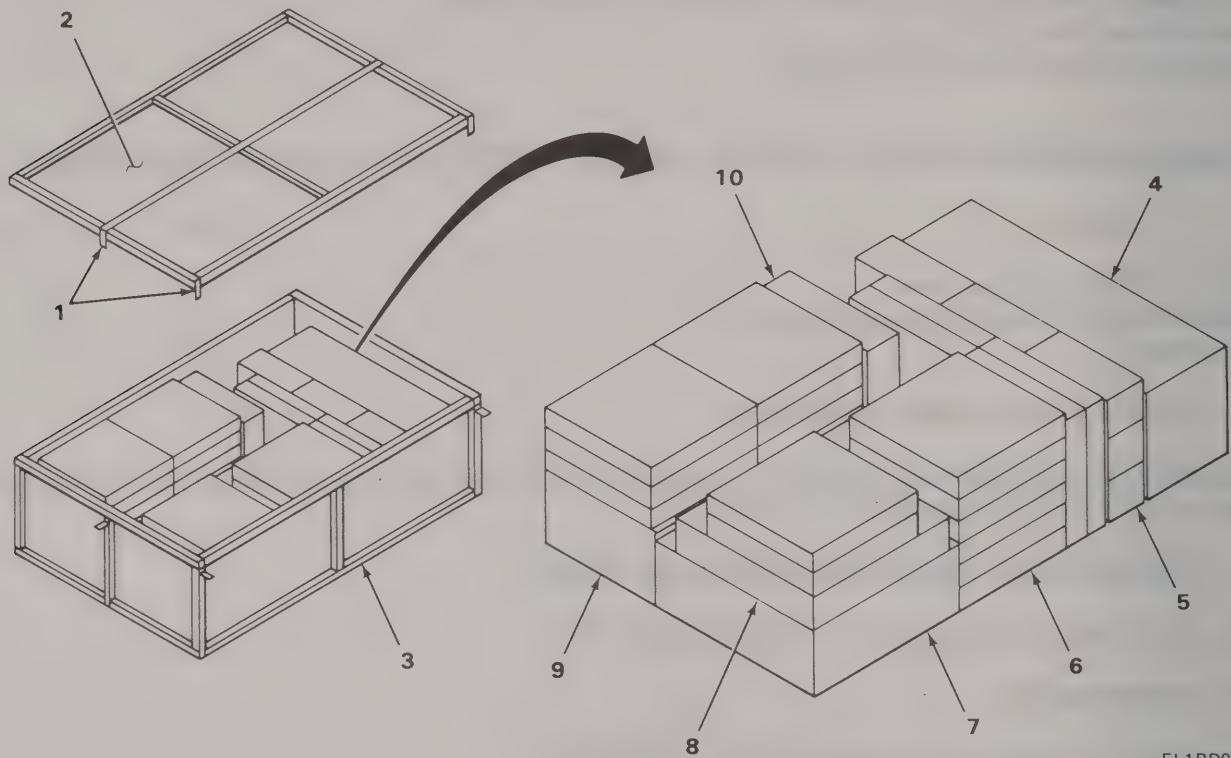
##### **4-4. UNPACKING.**

Each component of the CV-1918 is wrapped in cushioning material for protection and then sealed in a separate cardboard carton.

#### 4-4. UNPACKING. (CONT)

Any miscellaneous hardware required for installation is packed in the carton with the associated component. All individual cardboard cartons are then packed in one large wooden crate. Although the different CV-1918 models have different quantities of components, the unpacking procedure is the same.

TOOLS: Electronic Equipment Tool Kit, TK-101/G



EL1RD016

#### WARNING

Prevent injury to personnel when removing steel strapping by wearing heavy gloves and protective eyewear. Do not handle packing crates by the steel strapping.

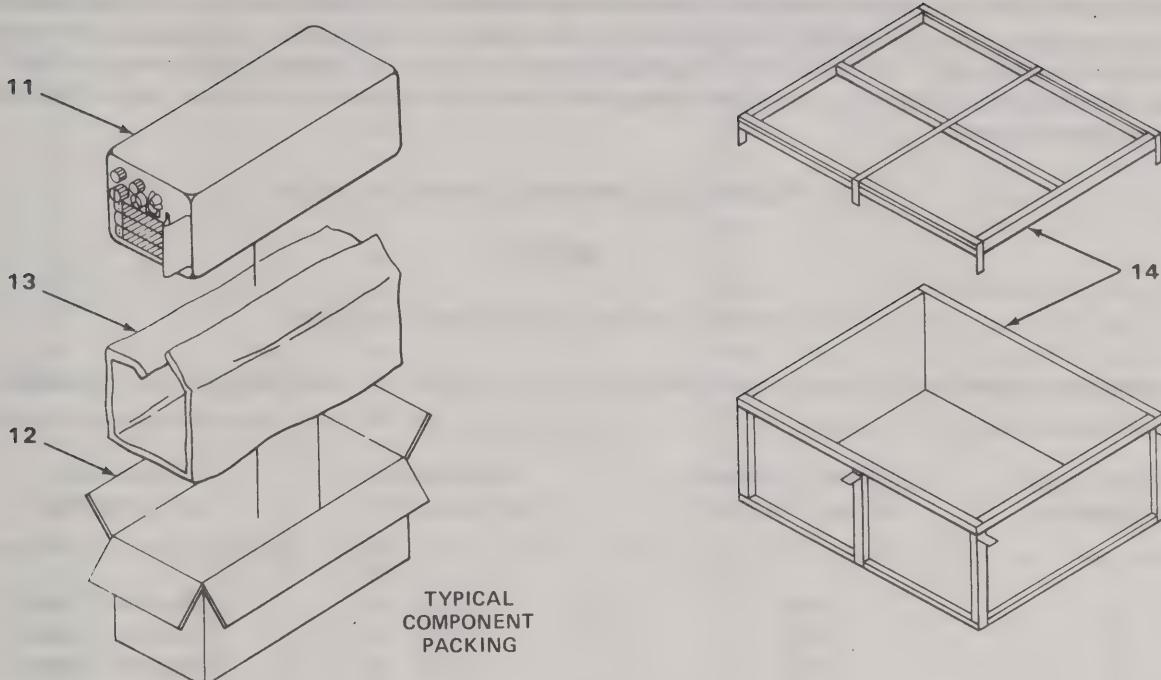
1. Cut steel strapping (1) and remove cover (2) from wooden crate (3).

#### NOTE

Empty cartons are packed in the crate to fill up space when shipping a CV-1918A(V) 3/G.

2. Remove cartons containing electronics unit (4), keycall pedestals (5), signal cables (6), distribution box (7), power cable (8), trunk units (9), and electronics unit mounting plates (10).

## 4-4. UNPACKING. (CONT)



EL1RD017

3. Unpack system components (11) from cartons (12) and unwrap cushioning material (13).
4. Return wooden crate (14) through established supply channels.

## 4-5. CHECKING UNPACKED EQUIPMENT.

Inspect the equipment for damage incurred during shipment. See paragraph 1-3 for instructions in reporting any damage.

Check the equipment against the packing slip to make sure shipment is complete. See table in paragraph 1-10 to verify the components you should have. Report discrepancies in accordance with paragraph 1-3, Maintenance Forms, Records and Reports.

Check that all applicable MWO's have been applied to the equipment. Current MWO's for the equipment will be listed in DA PAM 310-1. If the equipment has been modified, the MWO number will appear next to the nomenclature plate.

## 4-6. INSTALLATION INSTRUCTIONS.

Installation of the CV-1918 requires access to 32 separate telephone lines for interconnection to the automatic telephone CO. These lines are routed through the main distribution frame (MDF) along with the subscriber lines from the telephone switchboards. If the manual CO is already utilizing all receptacles and binding posts on the MDF panel, it will be necessary to take 26 pairs of telephone lines and one receptacle out of service and reassign them for use as trunks by the CV-1918.

## 4-6. INSTALLATION INSTRUCTIONS. (CONT)

The CV-1918 is connected to the MDF with an existing CX-2584/U signal cable. Refer to the appropriate manual CO technical manual (listed in appendix A) for instructions in cross-connecting signal pairs on the MDF in the particular facility. See the table below and perform the cross-connections so that the line-side wiring on the MDF corresponds to the wiring configuration of receptacle J21 on the CV-1918 electronics unit. The table identifies each pin according to its channel assignment in the electronics unit and, in addition, shows its respective termination point on the electronics unit internal barrier terminal boards.

## J21 RECEPTACLE WIRING CONFIGURATION

## NOTE

All wires are white except where indicated.

Connector pins without channel assignment are terminated at an insulated terminal or ground.

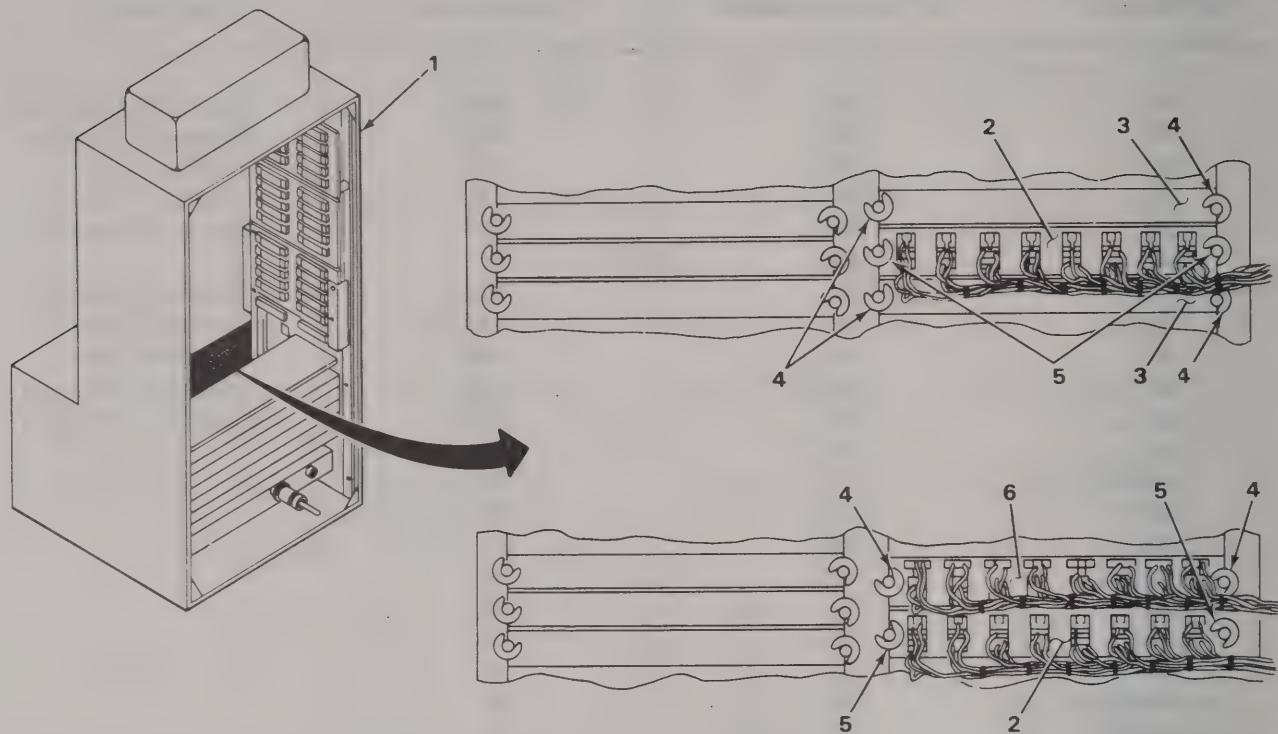
RECEPTACLE PIN NUMBER	BARRIER TERMINAL BOARD NUMBER	TERMINAL DESIGNATION	CHANNEL ASSIGNMENT
1	TB2	S1A	Channel 1 Send
2	TB2	S1B	Channel 1 Send
3	TB3	S3B	Channel 3 Send
4	TB2	R1A	Channel 1 Receive
5	TB2	R1B	Channel 1 Receive
6	TB2	S2A	Channel 2 Send
7	TB2	S2B	Channel 2 Send
8	TB2	R2A	Channel 2 Receive
9	TB2	R2B	Channel 2 Receive
10	TB3	S3A	Channel 3 Send
11	TB3	R3A	Channel 3 Receive
12	TB3	R3B	Channel 3 Receive
13	TB3	S4A	Channel 4 Send
14	TB3	S4B	Channel 4 Send
15	TB3	R4A	Channel 4 Receive
16	TB6	33	...
17	TB3	R4B	Channel 4 Receive
18	TB6	35	...
19	TB6	36	...
20	TB6	37	...
21	TB6	38	...
22	TB6	39	...
23	TB6	40	...
24	TB4	S6B	Channel 6 Send
25	TB6	41	...
26	TB6	42	...
27	TB4	S5A	Channel 5 Send
28	TB4	S5B	Channel 5 Send
29	TB4	R5A	Channel 5 Receive
30	TB4	R5B	Channel 5 Receive
31	TB4	S6A	Channel 6 Send

## 4-6. INSTALLATION INSTRUCTIONS. (CONT)

RECEPTACLE PIN NUMBER	BARRIER TERMINAL BOARD NUMBER	TERMINAL DESIGNATION	CHANNEL ASSIGNMENT
32	TB4	R6A	Channel 6 Receive
33	TB4	R6B	Channel 6 Receive
34	TB5	S7A	Channel 7 Send
35	TB5	S7B	Channel 7 Send
36	TB5	R7A	Channel 7 Receive
37	TB6	34	...
38	TB5	R7B	Channel 7 Receive
39	TB5	S8A	Channel 8 Send
40	TB5	S8B	Channel 8 Send
41	TB5	R8A	Channel 8 Receive
42	TB5	R8B	Channel 8 Receive
43	TB6	43	...
44	TB6	44	...
45	TB6	52	...
46	TB6	45	...
47	TB6	46	...
48	TB6	47	...
49	TB6	48	...
50	TB6	49	...
51 (Br)	TB6	50	...
52 (R)	TB6	51	...

## 4-6. INSTALLATION INSTRUCTIONS. (CONT)

## TRUNK UNIT



EL1RD018

**NOTE**

In certain facilities, the rear of the switchboards may have a back panel. Refer to applicable TM for instructions in removing panel.

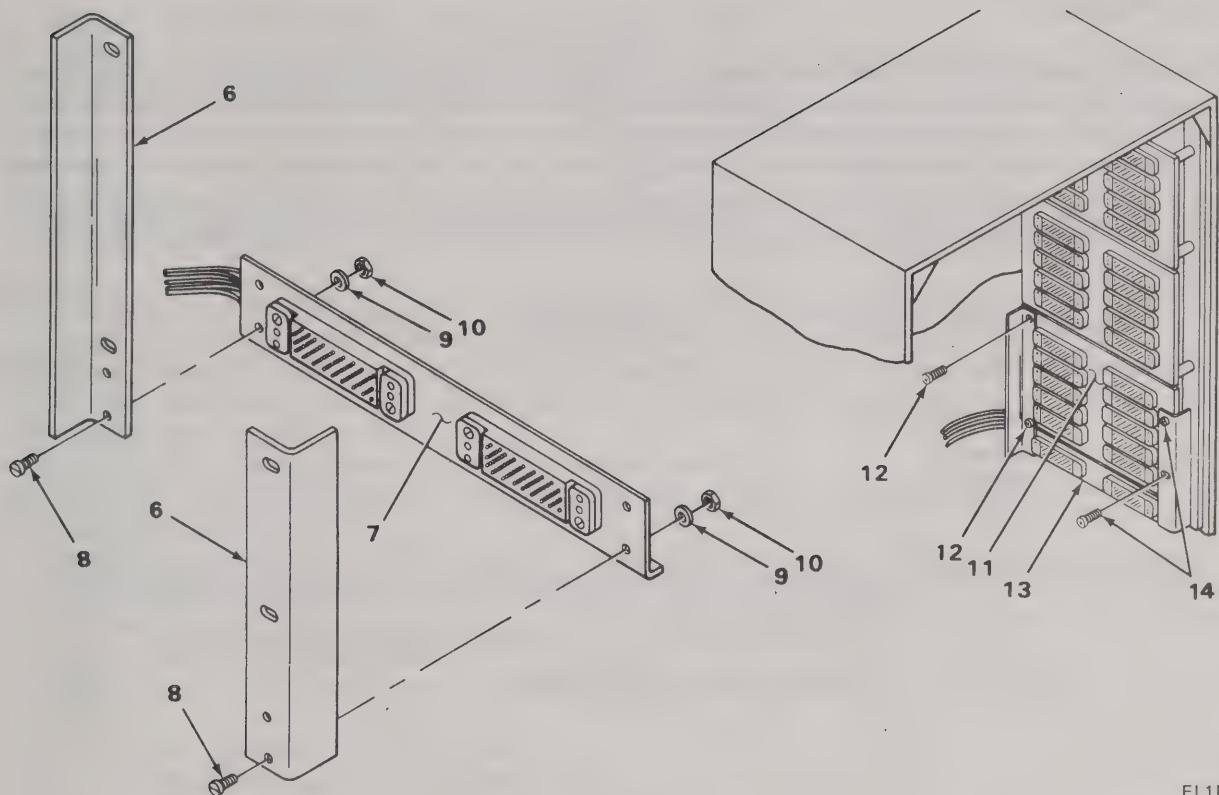
1. Working from rear of switchboard (1), locate magneto supervisory lamp panel (2) and two blank panel spacers (3).
2. Remove half disk fasteners (4) and two blank panel spacers (3). Save fasteners for reuse.
3. Remove half disk fasteners (5) and magneto supervisory lamp panel (2).

**CAUTION**

Use care when handling trunk unit panel and connector plate assembly to avoid breaking connecting wires.

4. Position trunk unit panel (6) at top of opening created by removal of magneto supervisory lamp panel (2) and two blank panel spacers (3). Secure with two half disk fasteners (4).
5. Position magneto supervisory lamp panel (2) in opening under trunk unit panel (6) and secure with half disk fasteners (5).

## 4-6. INSTALLATION INSTRUCTIONS. (CONT)



EL1RD019

**NOTE**

Observe TOP indication on connector plate to ensure installing plate between brackets with the correct side up.

6. Position left and right connector plate brackets (6) on trunk unit connector plate (7) and secure with four screws (8), washers (9) and nuts (10).
7. Locate lowest CB-LB line cable receptacle panel (11) and remove two mounting screws (12) nearest front of switchboard.

**NOTE**

When positioning connector plate, make sure wiring harness is routed around and behind plate.

8. Position trunk unit connector plate and bracket assembly (13) on receptacle panel (11) with holes in receptacle panel showing through slots in left-hand bracket. Install, but do not tighten, two mounting screws (12).
9. Remove two mounting screws (14) nearest rear of switchboard from receptacle panel (11).
10. Slide connector plate and bracket assembly (13) into position over mounting holes in receptacle panel (11) and secure with two mounting screws (14).
11. Tighten two mounting screws (12).
12. Repeat steps 1 through 11 for each trunk unit being installed in switchboard facility.

## 4-6. INSTALLATION INSTRUCTIONS. (CONT)

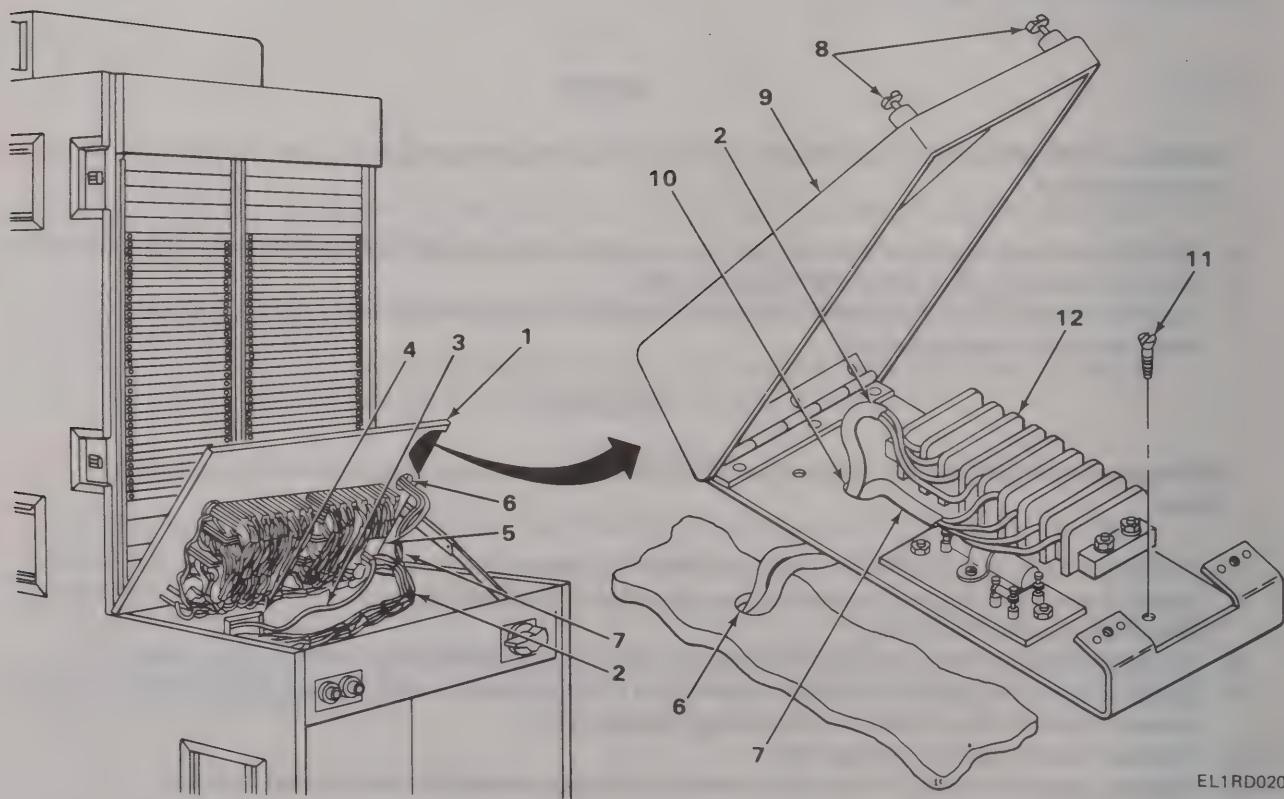
## KEYCALL PEDESTAL

When installing the CV-1918, the keycall pedestals are mounted in place of the standard switchboard dial assemblies. The wires that are part of the existing dial assembly have a standard color code, but the switchboard wires connected to these wires do not. To ensure that the keycall pedestal is properly installed, identify each switchboard wire according to the color of the dial wire to which it is attached and tag it with its new keycall pedestal terminal number. This must be done before removing dial assembly. The table below matches the color of the dial assembly wire to the new keycall pedestal terminal number.

COLOR OF DIAL WIRE	NEW TERMINAL NUMBER
Red	6
Brown	7
White	8
Green	9

**PRELIMINARY PROCEDURE:** Remove dial assembly and dial mounting bracket from switchboard keyshelf.

Tag switchboard wires for identification and save mounting screws. Refer to TM 11-2146.



EL1RD020

#### 4-6. INSTALLATION INSTRUCTIONS. (CONT)

1. Open switchboard keyshelf (1) and lock in upright position.
2. Working from rear of switchboard, insert trunk unit wiring harness (2) and single, loose, brown trunk unit wire (3) through access port (4) under keyshelf.

#### NOTE

The common connection pin (5) for the ring answer/dial switches is the pin in the lower, right-hand corner of the switch connector-pin layout on the underside of the keyshelf.

3. Working from front of switchboard, solder single, unharnessed, brown wire (3), coming from trunk unit, to ring answer/dial switch common connection pin (5). Refer to TB SIG-222.
4. Insert trunk unit wiring harness (2) through hole (6) in keyshelf along with switchboard wires (7) that were tagged when dial assembly and dial mounting bracket were removed. Close and secure switchboard keyshelf (1).
5. Loosen two captive screws (8) and open keycall pedestal (9).
6. Feed trunk unit wiring harness (2) and switchboard wires (7) through access port (10) in keycall pedestal base.
7. Position keycall pedestal (9) on keyshelf (1) and secure with two wood screws (11) removed and saved during removal of dial assembly and dial mounting bracket.
8. Connect four tagged switchboard wires to numbered terminals on TB1 (12) on keycall pedestal base. Remove tags from wires.
9. Connect five wires from trunk unit harness (2) to terminals on TB1 (12) as follows:

Orange wire to terminal number 1.  
 Black wire to terminal number 2.  
 Brown wire to terminal number 3.  
 Red wire to terminal number 4.  
 White wire to terminal number 5.

10. Close keycall pedestal (9) and secure with two captive screws (8).
11. Repeat steps 1 through 10 for each keycall pedestal being installed in switchboard facility.

#### ELECTRONICS UNIT

The electronics unit is mounted to the top of the switchboard you choose to designate as the first operator's position. In certain facilities, it may be necessary to remove equipment or structures mounted on top of the switchboard that would interfere with this installation.

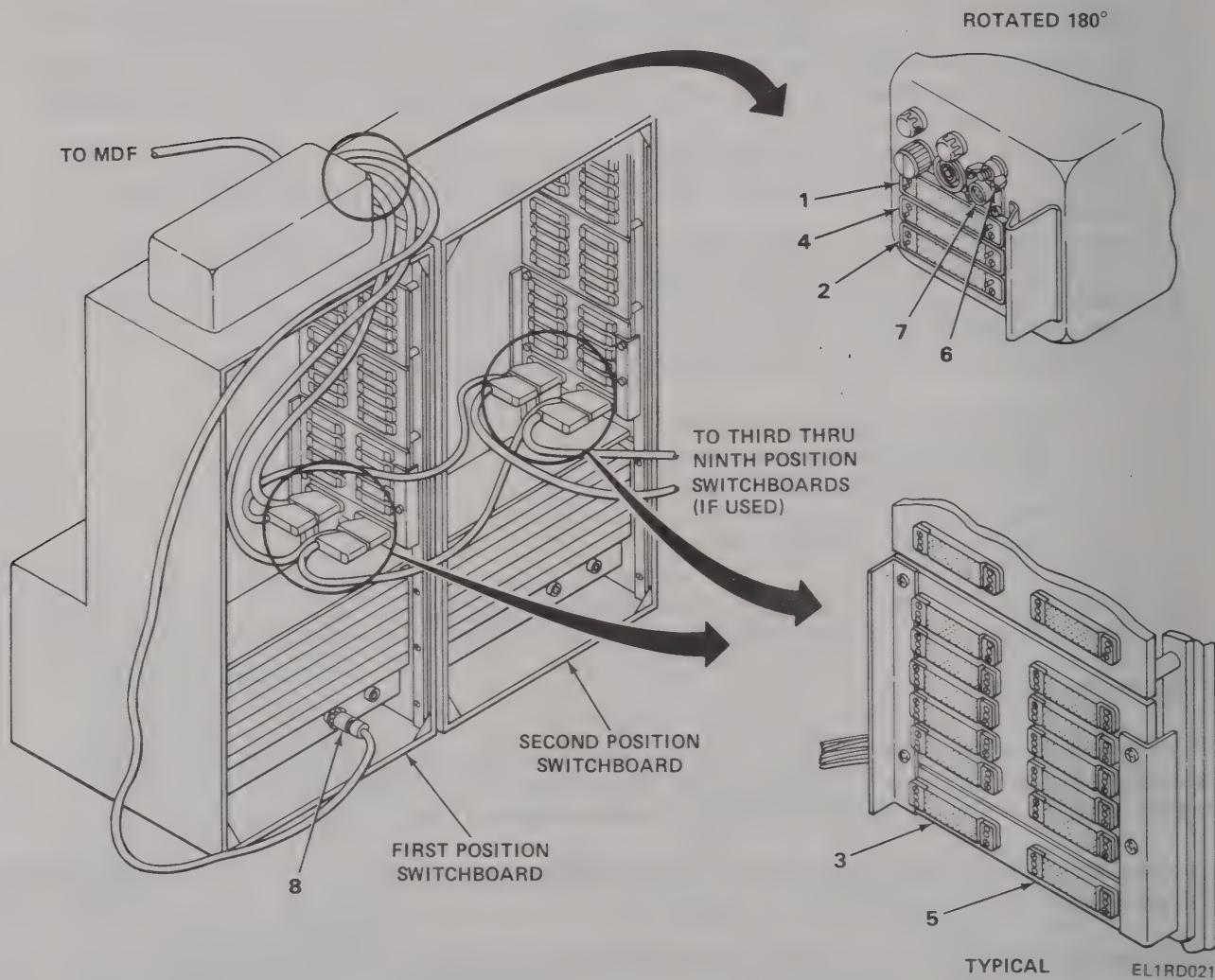
The electronics unit is mounted with the lightning arrester panel facing the rear of the switchboard and the signal cable receptacles toward the operator's left.

Included with each CV-1918 are two predrilled aluminum mounting plates and eight bolts. This hardware is to be used, in any combination necessary, to secure the electronics unit to the various switchboard configurations.

## 4-6. INSTALLATION INSTRUCTIONS. (CONT)

## CABLING

After the electronics unit and all the trunk units and keycall pedestals have been mounted, the CV-1918 installation is completed by interconnecting the trunk units and the electronics unit using the CX-2584/U cables provided. The following procedure describes the installation of the CV-1918 in a three-switchboard facility; however, the procedure is typical for any CV-1918 installation.



#### 4-6. INSTALLATION INSTRUCTIONS. (CONT)

##### **CAUTION**

Use a piloted screwdriver to tighten the captive screw fasteners on the signal cable connectors to avoid damaging the screwdriver slots or internal threads.

1. Connect an existing signal cable from facility main distribution frame to electronics unit receptacle J21 (1).
2. Connect receptacle J19 (2) to first position trunk unit receptacle J9 (3).
3. Connect receptacle J20 (4) to first position trunk unit receptacle J10 (5).
4. Connect a second signal cable between first position trunk unit receptacle J9 (3) and second position receptacle J9.
5. Connect a second signal cable between second position trunk unit receptacle J9 (3) and third position receptacle J9.
6. Repeat step 5 for any and all remaining switchboard positions until all J9 receptacles are interconnected in parallel.
7. Connect a second signal cable between first position trunk unit receptacle J10 (5) and second position receptacle J10.
8. Connect a second signal cable between second position trunk unit receptacle J10 (5) and third position receptacle J10.
9. Repeat step 8 for any and all remaining switchboard positions until all J10 receptacles are interconnected in parallel.
10. Connect a suitable ground wire from any facility ground to electronics unit GND terminal (6).
11. Connect power cable from receptacle J22 (7) on electronics unit to spare -48 vdc receptacle (8) on bottom rear of first position switchboard.

#### 4-7. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.

It is necessary to perform an installation check at each switchboard position in order to ensure that the CV-1918 has been properly installed. See paragraph 2-3 for installation check procedures.

Performance of this check will verify the interconnection between the switchboard facility and the automatic telephone CO as well as checking the CV-1918 itself. Check all signal cable connections first if any difficulty is encountered during the installation check.

### **Section III ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)**

#### **4-8. GENERAL.**

Organizational preventive maintenance procedures for the CV-1918 are limited to routine things you should do anytime you see the need, including: covering of unused receptacles, stowing unused equipment, and procedures such as equipment inventory, cleaning of components, checking for frayed cables and loose nuts, bolts, and screws, as well as touchup painting.

In addition, at quarterly intervals, you must check for technical publications and current MWO's. Requisition replacements for any missing or unserviceable operator and organizational maintenance manuals. Check that current MWO's have been applied and that the MWO number is stamped as required.

If the CV-1918 must be kept in service, check and service only those things that can be checked and serviced without disturbing operation. Make complete checks and services when the equipment can be shut down.

If the equipment fails to operate, see the organizational troubleshooting steps in this manual. Refer to DA Pam 738-750 as a guide for reporting problems and using forms. For recording PMCS results, use DA Form 2404, Equipment Inspection and Maintenance Worksheet.

#### **NOTE**

Keep in mind all warnings and cautions when doing PMCS or any routine checks.

### **Section IV ORGANIZATIONAL TROUBLESHOOTING**

#### **4-9. GENERAL.**

The troubleshooting table lists malfunctions that may be found during PMCS or when the equipment is being operated.

The troubleshooting table does not list all the problems that could occur. If your problem is not listed, or if the procedures given do not correct the problem, report it to a higher level of maintenance.

When working on any problem, be sure to report your work on the forms shown in DA Pam 738-750.

## SYMPTOM INDEX

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Does not operate and power indicator lamp lit.....	4-13
<b>NIGHT ALARM</b>	
Does not sound when SR indicator lamps light.....	4-14
<b>BY INDICATOR LAMP</b>	
Does not light at one operator position when corresponding channel busy.....	4-14
<b>SR INDICATOR LAMP</b>	
Does not light at one operator position when service request incoming on corresponding channel.....	4-14
<b>EXCESSIVE NOISE</b>	
On one telephone channel .....	4-14
<b>POWER INDICATOR LAMP</b>	
Does not light when CV-1918 energized.....	4-14

## ORGANIZATIONAL TROUBLESHOOTING

**MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION**

1. CV-1918 system does not operate and power indicator lamp is not lit.

Step 1. Check that power cable connectors are properly inserted in both switchboard and electronics unit.

If either power cable connector is improperly inserted, reinsert.

Step 2. Check 0.5 AMP fuse in electronics unit.

If 0.5 AMP fuse is defective, replace. (See para 4-12.)

2. CV-1918 system does not operate and power indicator lamp is lit.

Check 5.0 AMP fuse in electronics unit.

If 5.0 AMP fuse is defective, replace. (See para 4-12.)

ORGANIZATIONAL TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

3. NIGHT ALARM does not sound when SR indicator lamps light.

Check that NIGHT ALARM OFF-LOUD control is not set to OFF position.

If control is set to OFF, turn control clockwise to switch alarm on and then set to desired volume level.

4. BY indicator lamp does not light at one operator position when corresponding channel is busy.

Check BY indicator lamp.

If indicator lamp is defective, replace. (See para 4-15.)

5. SR indicator lamp does not light at one operator position when service request is incoming on corresponding channel.

Check SR indicator lamp.

If indicator lamp is defective, replace. (See para 4-15.)

6. Excessive noise on one telephone channel.

Inspect corresponding lightning arresters.

If lightning arrester is charred or burnt, replace. (See para 4-13.)

7. Power indicator lamp does not light when CV-1918 is energized.

Check power indicator lamp.

If indicator lamp is defective, replace. (See para 4-15.)

## Section V ORGANIZATIONAL MAINTENANCE PROCEDURES

Subject	Para	Page
General.....	4-10	4-15
Cleaning .....	4-11	4-15
Fuse Replacement.....	4-12	4-16
Lightning Arrester Replacement.....	4-13	4-17
Touchup Painting.....	4-14	4-17
Indicator Lamp Replacement .....	4-15	4-18

### 4-10. GENERAL.

This section provides instructions for organizational maintenance of the CV-1918. The following initial setup information applies to all procedures.

Resources required are not listed unless they apply only to the particular procedure.

Personnel required is not listed as all tasks can be done by one technician.

The normal standard equipment condition to start a maintenance task is power off. Equipment condition is not listed unless some other condition is required.

### 4-11. CLEANING.

A mild soap or detergent and water may be used for most general cleaning of the CV-1918 components. Loose dust and dirt should first be removed with a clean, dry, lint-free cloth or brush.

#### **WARNING**

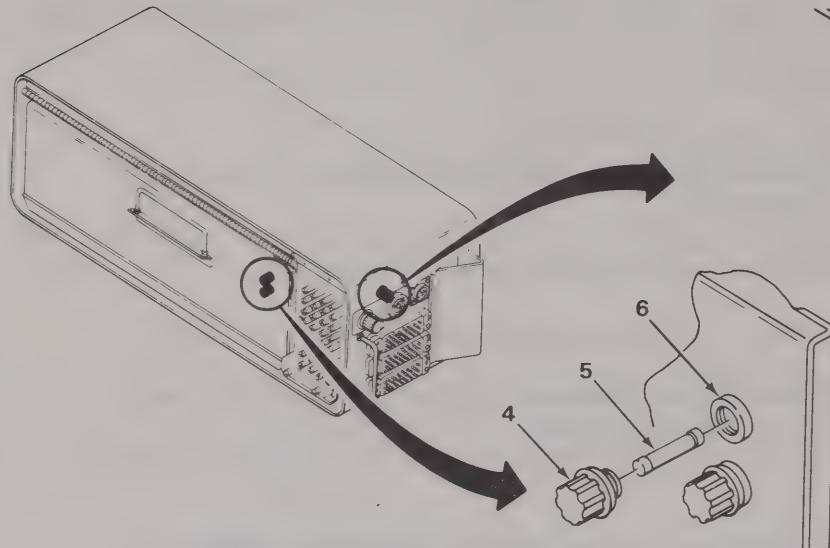
Fumes of TRICHLOROTRIFLUOROETHANE are poisonous. Provide adequate ventilation whenever you use TRICHLOROTRIFLUOROETHANE. Do not use solvent near heat or open flame. TRICHLOROTRIFLUOROETHANE will not burn, but heat changes the gas into poisonous, irritating fumes. DO NOT breathe the fumes or vapors. TRICHLOROTRIFLUOROETHANE dissolves natural skin oils. DO NOT get the solvent on your skin. Use gloves, sleeves and an apron which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

To remove ground-in dirt, grease or fungus, moisten (do not soak) a cloth with TRICHLOROTRIFLUOROETHANE. After cleaning, wipe dry with a clean cloth.

#### 4-12. FUSE REPLACEMENT.

The CV-1918 is protected by two fuses which are mounted on the end panel of the electronics unit. Two spare fuses are kept in holders mounted in the card cage cover. The replacement procedure for both fuses is identical. When replacing a fuse, be sure to select the spare fuse with the same rating.

MATERIALS/PARTS: Fuse



EL1RD022

#### REMOVAL

1. Turn fuse holder cap (1) to left and remove.
2. Remove defective fuse (2) from fuse holder (3) and discard.
3. Turn spare fuse holder cap (4) to left and remove.
4. Remove spare fuse (5) from spare fuse holder (6).
5. Replace fuse holder cap (4) on fuse holder (6) and turn to right to tighten.

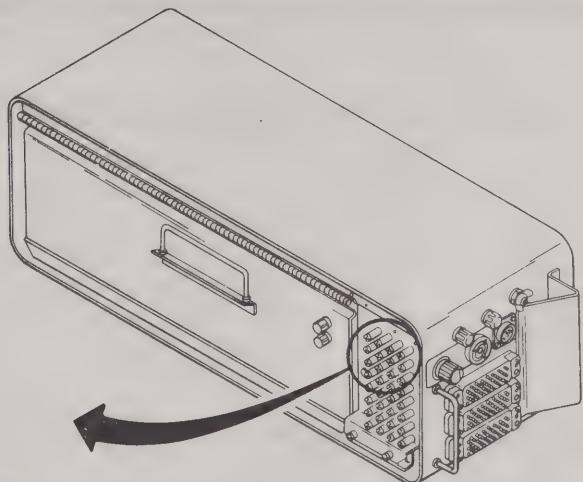
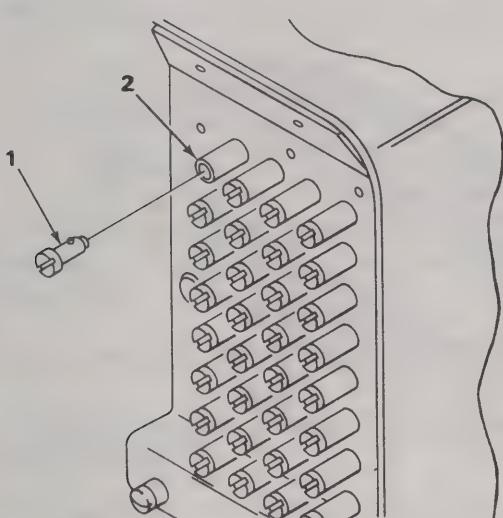
#### INSTALLATION

1. Insert spare fuse (5) in fuse holder (3).
2. Replace fuse holder cap (1) on fuse holder (3) and turn to right to tighten.

#### 4-13. LIGHTNING ARRESTER REPLACEMENT.

The CV-1918 is equipped with 32 lightning arresters to protect each signal wire connected to the electronics unit. The effects of a defective lightning arrester can usually be heard on the associated telephone channel. Panel markings on the electronics unit identify the channel assignments of the lightning arresters and will help you locate the lightning arrester(s) responsible for the noisy channel.

MATERIALS/PARTS: Lightning arrester



EL1RD023

#### REMOVAL

Position flat-tip screwdriver in slot of lightning arrester (1). Push in, turn arrester one-quarter turn to left, and remove.

#### INSTALLATION

Position lightning arrester (1) in holder (2) and, using flat-tip screwdriver, press in and turn arrester one-quarter turn to right to lock in place.

#### 4-14. TOUCHUP PAINTING.

Remove rust and corrosion from metal surfaces by lightly sanding with fine sandpaper. Brush two thin coats of paint on bare metal to prevent further corrosion.

The trunk unit panel and keycall pedestal are finished in smooth, semigloss enamel, black color number 27038. The electronics unit case is finished in smooth, semigloss enamel, green color number X24087. Both of these finishes conform to FED-STD-595 as listed in SB 11-573.

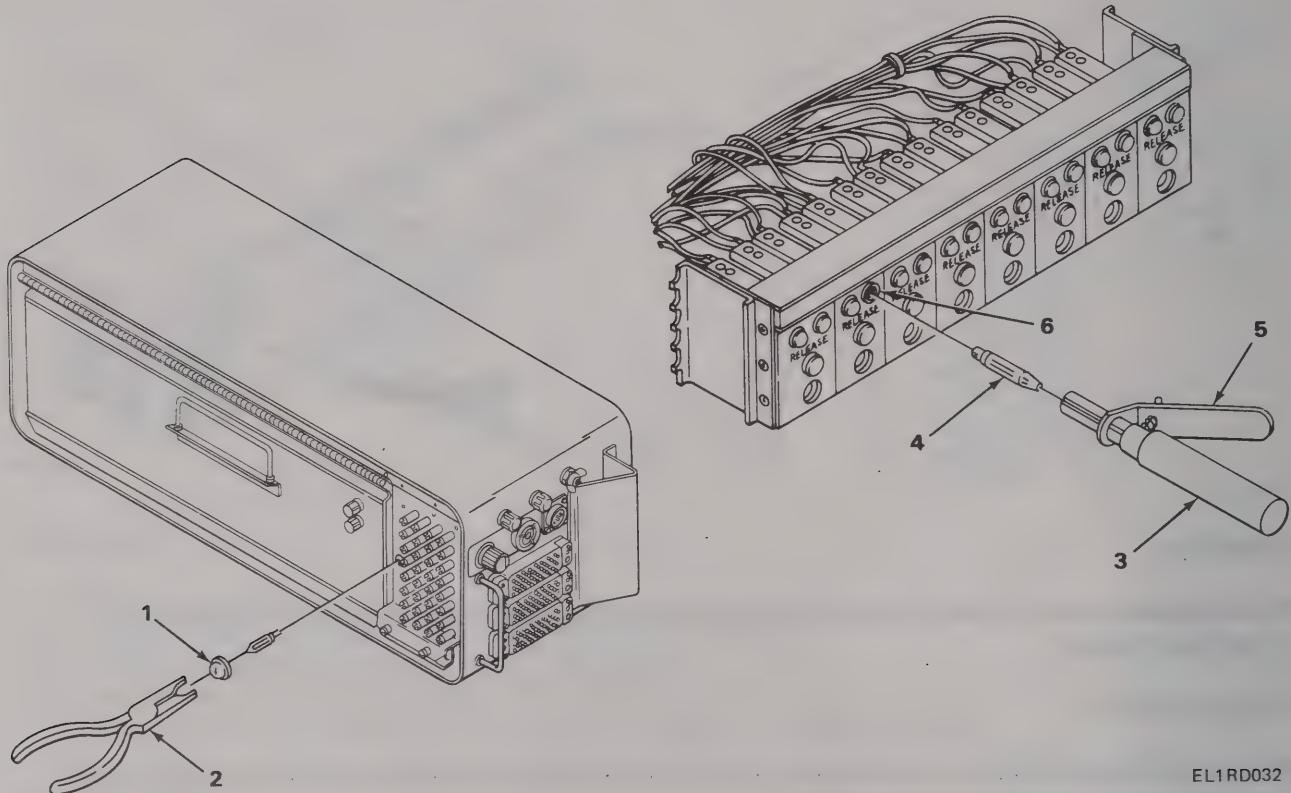
Refer to TB 43-0118 for instructions on painting and preserving electronics equipment.

#### 4-15. INDICATOR LAMP REPLACEMENT.

The CV-1918 has two indicator lamps associated with each trunk channel and one indicator lamp in the electronics unit. The replacement procedure for all indicator lamps is identical.

**TOOLS:** Lamp Extractor, WECO 553A or equivalent  
Cap Extractor, UTICA B-327 or equivalent

**MATERIALS/PARTS:** Lamp, Incandescent, MS15609-6



EL1RD032

#### REMOVAL

1. Grasp lampholder cap (1) with cap extractor (2) and pull straight out.
2. Insert lamp extractor (3) over lamp (4), press down on handle (5) and pull lamp straight out.

#### INSTALLATION

1. Insert lamp (4) into lampholder (6).
2. Replace lampholder cap (1) on lampholder.

## CHAPTER 5

### DIRECT SUPPORT MAINTENANCE

Subject	Section	Page
Repair Parts, Special Tools, TMDE and Support Equipment .....	I	5-1
Direct Support Troubleshooting.....	II	5-1
Direct Support Maintenance Procedures .....	III	5-10

#### Section I REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

Subject	Para	Page
Common Tools and Equipment.....	5-1	5-1
Special Tools, TMDE and Support Equipment .....	5-2	5-1
Repair Parts .....	5-3	5-1

##### 5-1. COMMON TOOLS AND EQUIPMENT.

A complete listing of common tools and equipment is given in the Maintenance Allocation Chart (MAC) in appendix B.

##### 5-2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT.

There are no special tools needed to maintain the CV-1918.

##### 5-3. REPAIR PARTS.

Repair parts for the direct support maintenance of the CV-1918 are listed and illustrated in the repair parts and special tools list in TM 11-5805-553-23P.

#### Section II DIRECT SUPPORT TROUBLESHOOTING

Subject	Para	Page
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Symptom Index .....		5-2
Direct Support Troubleshooting.....		5-4

##### 5-4. GENERAL.

The troubleshooting table lists malfunctions that may be found during PMCS or when the equipment is being operated.

The troubleshooting table does not list all the problems that could occur. If your problem is not listed, or if the procedures given do not correct the problem, report it to a higher level of maintenance.

#### 5-4. GENERAL. (CONT)

To simplify troubleshooting the CV-1918, the following symptom index and troubleshooting tables have been divided into four sections. These sections group the problems according to how much of the CV-1918 system is being affected. This is done because a malfunction symptom that occurs at only one operator position may not have the same cause as the identical symptom when it occurs at every operator position.

To use the troubleshooting tables, you must first determine how many channels and operator positions are involved and then find a description of the problem in the corresponding section of the symptom index. The index will give you the page number on which you will find your problem and possible corrective actions. Turn to that page, find your problem, and use the procedures given to correct it.

There are schematics and wiring diagrams in the back of this manual to provide you with additional information when troubleshooting the CV-1918.

When working on any problem, be sure to report your work on the forms shown in DA Pam 738-750.

#### SYMPTOM INDEX

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SR INDICATOR LAMP	
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PROBLEMS AFFECTING ALL CHANNELS AT ONE OPERATOR POSITION	
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KEYSENDER DIALING	
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No tones heard when keying digits on keysender .....	5-5

## SYMPTOM INDEX (CONT)

Page

## PROBLEMS AFFECTING SAME CHANNEL AT ALL OPERATOR POSITIONS

## NIGHT ALARM

Inoperative (SR indicator lamps do not light).....	5-6
Inoperative (SR indicator lamps light).....	5-6

## SR INDICATOR LAMPS

Inoperative (NIGHT ALARM operates) .....	5-6
Stay lit when service requests are answered .....	5-6

## BY INDICATOR LAMPS

Inoperative.....	5-6
------------------	-----

## DTMF TONES

Signal tones not heard when keying digits .....	5-7
---	-----

## RELEASE TONE

Not heard when RELEASE button is pressed.....	5-7
---	-----

## ACKNOWLEDGE TONE

Not heard after SEIZE button is pressed .....	5-7
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## RINGBACK TONE

Not heard by four-wire telephone users.....	5-7
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## VOICE PATH

No two-way communications between two- and four-wire telephone users .....	5-7
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## PROBLEMS AFFECTING ALL CHANNELS AT ALL OPERATOR POSITIONS

## ELECTRONICS UNIT

Inoperative (Power indicator lamp does not light).....	5-8
Inoperative (Power indicator lamp lights).....	5-8

## ACKNOWLEDGE TONE

Not heard after SEIZE button is pressed .....	5-8
---	-----

## RINGBACK TONE

Not heard by four-wire telephone users.....	5-8
Is continuous .....	5-8

## SYMPTOM INDEX (CONT)

Page

## PROBLEMS AFFECTING ALL CHANNELS AT ALL OPERATOR POSITIONS (CONT)

## RELEASE TONE

Not sent when RELEASE button is pressed ..... 5-9

## NIGHT ALARM

Inoperative (SR indicator lamps light) ..... 5-9

## SR INDICATOR LAMPS

Stay lit when service requests are answered ..... 5-9

## DIRECT SUPPORT TROUBLESHOOTING

## MALFUNCTION

## TEST OR INSPECTION

## CORRECTIVE ACTION

## PROBLEMS AFFECTING ONE CHANNEL AT ONE OPERATOR POSITION

1. Acknowledge tone is not heard after SEIZE button is pressed. DTMF tones are normal.

Inspect channel jack.

Replace channel jack if defective. (See para 5-13.)

2. Release tone is not sent when RELEASE button is pressed.

Test RELEASE button for continuity.

Replace RELEASE button if defective. (See para 5-16.)

3. SR indicator lamp stays lit when operator answers service request.

Inspect channel jack.

Replace channel jack if defective. (See para 5-13.)

## DIRECT SUPPORT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

---

## PROBLEMS AFFECTING ALL CHANNELS AT ONE OPERATOR POSITION

1. Acknowledge tone is not heard after SEIZE button is pressed.

Check SEIZE button for continuity.

Replace SEIZE button if defective. (See para 5-14.)

2. Telephone numbers containing one or more specific digits cannot be reached using keycall pedestal keysender.

Press each keysender button and listen for DTMF tones.

If only a single tone or no tone at all is heard when keying one or more digits, replace keysender/oscillator assembly. (See para 5-15.)

3. No telephone numbers can be reached using keycall pedestal keysender.

Press each keysender button and listen for DTMF tones.

If only single tones are heard as each digit is keyed, replace keysender/oscillator assembly. (See para 5-15.)

If no DTMF tones are heard, see the following malfunction.

4. No DTMF tones are heard as digits are keyed on keysender.

Step 1. Check for 3.0 vdc at S10-1 on keysender. (See para 5-10.)

If voltage is not correct, replace keysender/oscillator assembly. (See para 5-15.)

Step 2. Check for 0.7 v p-p DTMF at 2A1E15 as each digit is keyed. (See para 5-8.)

If signal is not correct, replace oscillator printed circuit board. (See para 5-15.)

**DIRECT SUPPORT TROUBLESHOOTING (CONT)**

**MALFUNCTION**

**TEST OR INSPECTION**

**CORRECTIVE ACTION**

**PROBLEMS AFFECTING SAME CHANNEL AT ALL OPERATOR POSITIONS**

1. NIGHT ALARM does not operate and SR indicator lamps do not light.

Check voltage at TP4 on corresponding analog PCB while sending seize tone. (See para 5-8.)

If voltage is correct, replace analog PCB. (See para 5-6.)

If voltage is 0 v, replace corresponding logic PCB. (See para 5-6.)

2. NIGHT ALARM does not operate. SR indicator lamps light.

Check voltage on pin 19 of corresponding logic PCB with the SR indicator lamps lit. (See para 5-10.)

If voltage is not between 0.45 and 0.55 vdc, replace logic PCB. (See para 5-6.)

3. SR indicator lamps do not light. NIGHT ALARM operates.

Check voltage on pin 24 of corresponding logic PCB while sending seize tone. (See para 5-10.)

If voltage is not between 43.2 and 52.8 vdc, replace logic PCB. (See para 5-6.)

4. SR indicator lamps stay lit when service request is answered.

Check if two-wire telephone user hears sidetone.

If no sidetone is heard by two-wire telephone user, replace logic PCB. (See para 5-6.)

5. BY indicator lamps do not light when a plug is in a corresponding channel jack.

Temporarily substitute logic PCB associated with functioning channel for logic PCB in defective channel. (See para 5-6.)

If BY indicator lamps now operate correctly, replace original logic PCB. (See para 5-6.)

## DIRECT SUPPORT TROUBLESHOOTING (CONT)

## MALFUNCTION

## TEST OR INSPECTION

## CORRECTIVE ACTION

---

- 6. No DTMF tones are heard as digits are keyed on keysender.

Temporarily substitute logic PCB associated with functioning channel for logic PCB in defective channel. (See para 5-6.)

If DTMF tones are now audible, replace original logic PCB. (See para 5-6.)

- 7. Release tone is not sent when RELEASE buttons are pressed.

Temporarily substitute logic PCB associated with functioning channel for logic PCB in defective channel. (See para 5-6.)

If release tone is now operable, replace original logic PCB. (See para 5-6.)

- 8. Acknowledge tone is not heard when SEIZE button is pressed. DTMF tones are normal.

Temporarily substitute logic PCB associated with functioning channel for logic PCB in defective channel. (See para 5-6.)

If acknowledge tone is now operable, replace original logic PCB. (See para 5-6.)

- 9. Ringback tone is not heard by four-wire telephone users.

Temporarily substitute logic PCB associated with functioning channel for logic PCB in defective channel. (See para 5-6.)

If ringback tone is now operable, replace original logic PCB. (See para 5-6.)

- 10. Two-way communication is not possible between two- and four-wire telephone users. Voice transmission goes in only one direction.

Temporarily substitute logic PCB associated with functioning channel for logic PCB in defective channel. (See para 5-6.)

If two-way communication is now possible, replace original logic PCB. (See para 5-6.)

**DIRECT SUPPORT TROUBLESHOOTING (CONT)**

**MALFUNCTION**

**TEST OR INSPECTION**

**CORRECTIVE ACTION**

**PROBLEMS AFFECTING ALL CHANNELS AT ALL OPERATOR POSITIONS**

1. CV-1918 does not operate and power indicator lamp does not light.

Check ON-OFF switch for continuity.

Replace switch if defective. (See para 5-20.)

2. CV-1918 does not operate. Power indicator lamp lights.

Check voltages at TP1 and TP2 on common PCB.

Replace common PCB if voltage at TP1 is not between -5.4 and -6.6 vdc, or if voltage at TP2 is not between -2.7 and -3.3 vdc. (See para 5-6.)

3. Acknowledge tone is not heard when SEIZE button is pressed.

Check signal at TP2 and at pin 13 on tone generator PCB. (See para 5-8.)

If signal is not 0.3 v p-p at 2250 Hz between -2.6 and -3.2 vdc, replace tone generator PCB. (See para 5-6.)

4. Ringback tone is not heard by four-wire telephone users.

Check signal at TP1 on tone generator PCB.

If signal is not 0.3 v p-p at 425 Hz between -5.4 and -6.6 vdc, replace tone generator PCB. (See para 5-6.)

5. Ringback tone is continuous.

Check signal at TP7 on tone generator PCB.

If signal is not 5.1 v p-p at 0.167 Hz between -2.55 and -3.15 vdc, or if signal is not a square wave, 4 seconds high and 2 seconds low, replace tone generator PCB. (See para 5-6.)

## DIRECT SUPPORT TROUBLESHOOTING (CONT)

## MALFUNCTION

## TEST OR INSPECTION

## CORRECTIVE ACTION

---

6. Release tone is not sent when RELEASE button is pressed.

Check signal at TP4 on tone generator PCB.

If signal is not 0.3 v p-p at 2600 Hz between -2.55 and -3.15 vdc, replace tone generator PCB. (See para 5-6.)

7. NIGHT ALARM does not operate. SR indicator lamps light.

Set NIGHT ALARM OFF-LOUD control to LOUD (maximum) position and check voltage across control terminals.

If voltage is not between -4.0 and -6.0 vdc, replace NIGHT ALARM OFF-LOUD control. (See para 5-19.)

If voltage is between -4.0 and -6.0 vdc, replace NIGHT ALARM horn. (See para 5-12.)

8. SR indicator lamps stay lit when service requests are answered.

Check signal at TP3 on tone generator PCB.

If signal is not 0.3 v p-p at 570 Hz between -2.55 and -3.15 vdc, replace tone generator PCB. (See para 5-6.)

### Section III DIRECT SUPPORT MAINTENANCE PROCEDURES

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Distribution Box Binding Post Assembly Replacement.....	5-21	5-32
Distribution Box Connector Receptacle Replacement .....	5-22	5-32
Trunk Unit Panel Assembly Removal.....	5-23	5-33

#### 5-5. GENERAL.

This section covers the repair and replacement of components authorized at the direct support level of maintenance.

For operation and shutdown procedures of the CV-1918, see paragraph 2-4.

Resources required are not listed unless they apply to the procedure. Electronic Equipment Tool Kit TK-105/G is required for all maintenance tasks. Other tools, not contained in this kit, will be listed as required.

Personnel required are listed only if the task requires more than one technician. If personnel are not listed, one technician can do the task.

The normal standard equipment condition to start a maintenance task is power off. Equipment condition is not listed unless some other condition is required.

Schematics at the end of this manual are provided to supplement the voltage and resistance charts if more information is needed.

## 5-6. ELECTRONICS UNIT PRINTED CIRCUIT BOARD REPLACEMENT.

The electronics unit contains 18 circuit boards: one logic and one analog per channel, a tone generator, and a common regulator. The replacement procedure for all circuit cards is identical. Make sure you replace a circuit board with the same type that was removed.

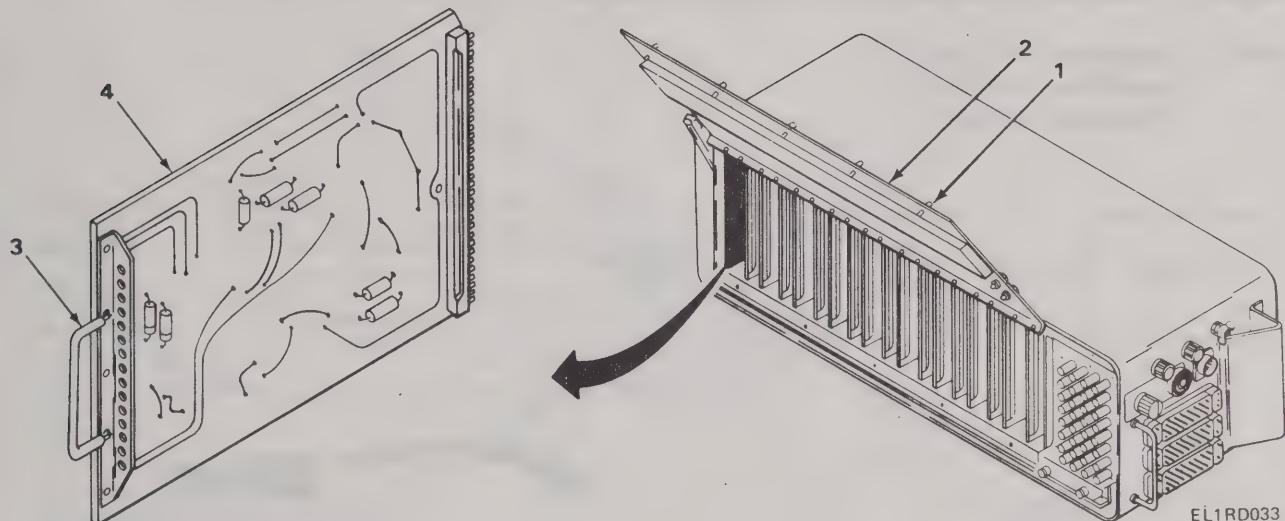
TOOLS: Card Puller, SMC-2016004

MATERIALS/PARTS: Channel Analog, SMD 743561

Channel Logic, SMD 743545

Tone Generator, SMD 743553

Common Regulator, SMD 743609



### REMOVAL

1. Working from rear of switchboard, loosen five captive screws (1) and open hinged panel door (2).
2. Using card puller (3), remove defective circuit board (4) from card cage.

### REPLACEMENT

#### NOTE

When installing circuit board, make sure that circuit board mounted components face the lightning arrester panel.

1. Insert circuit board (4) into card guides.
2. Press circuit board (4) straight into card cage until circuit board is firmly seated in place.
3. Close hinged panel door (2) and secure with five captive screws (1).

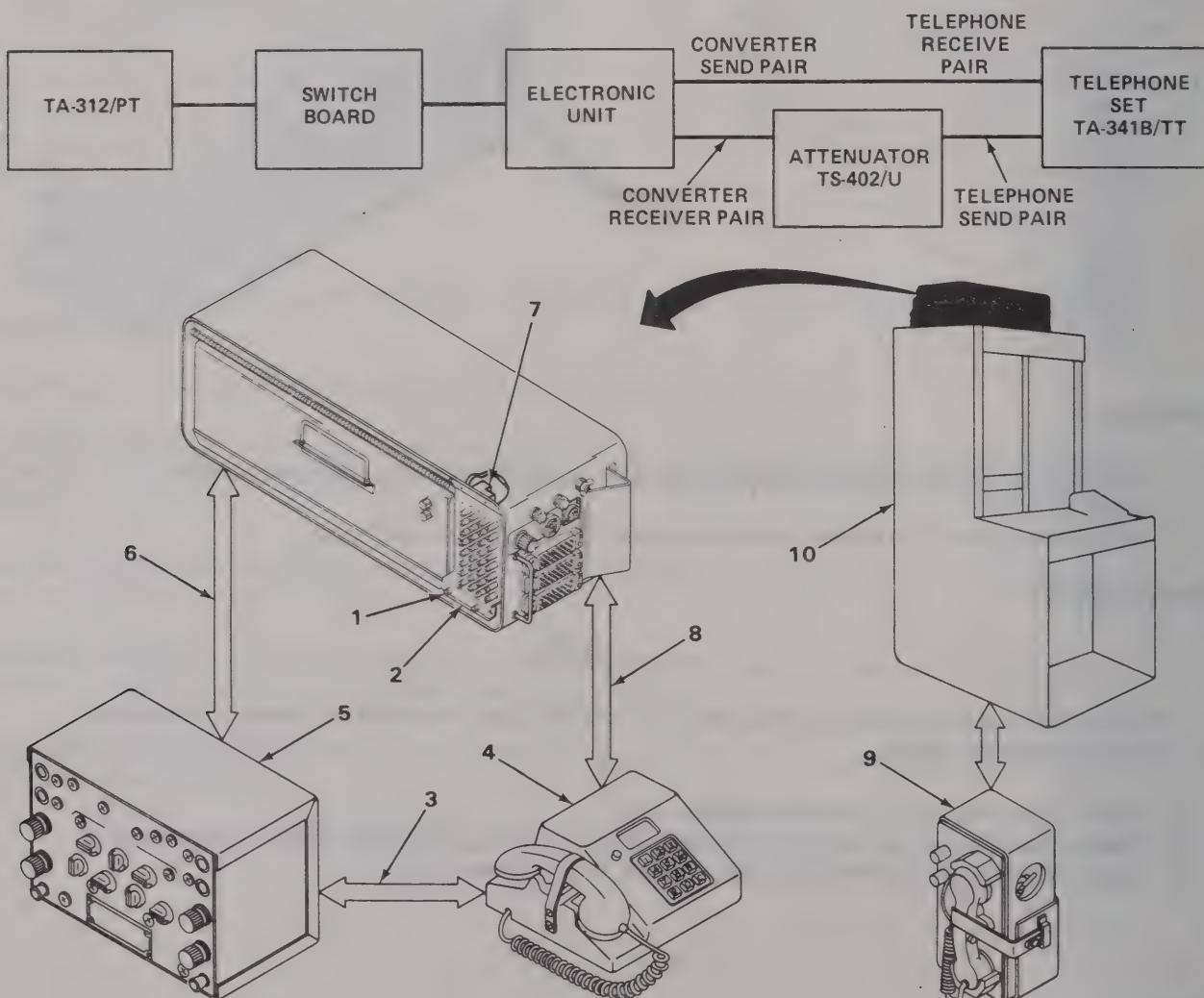
## 5-7. OPERATIONAL PERFORMANCE TEST.

To conduct an operational performance test on the CV-1918, two telephones and an attenuator are used. The attenuator simulates the loadline resistance of a distant switchboard and the two telephones simulate the local and distant switchboards.

The following procedure is designed to thoroughly test a CV-1918 installation and to detect operational defects. This test is to be performed anytime repairs are made to the electronic components of the CV-1918.

Instructions are provided to connect the TA-341B/TT directly to the CV-1918. If desired, the TA-341B/TT may be connected through the facility channel 1 connectors.

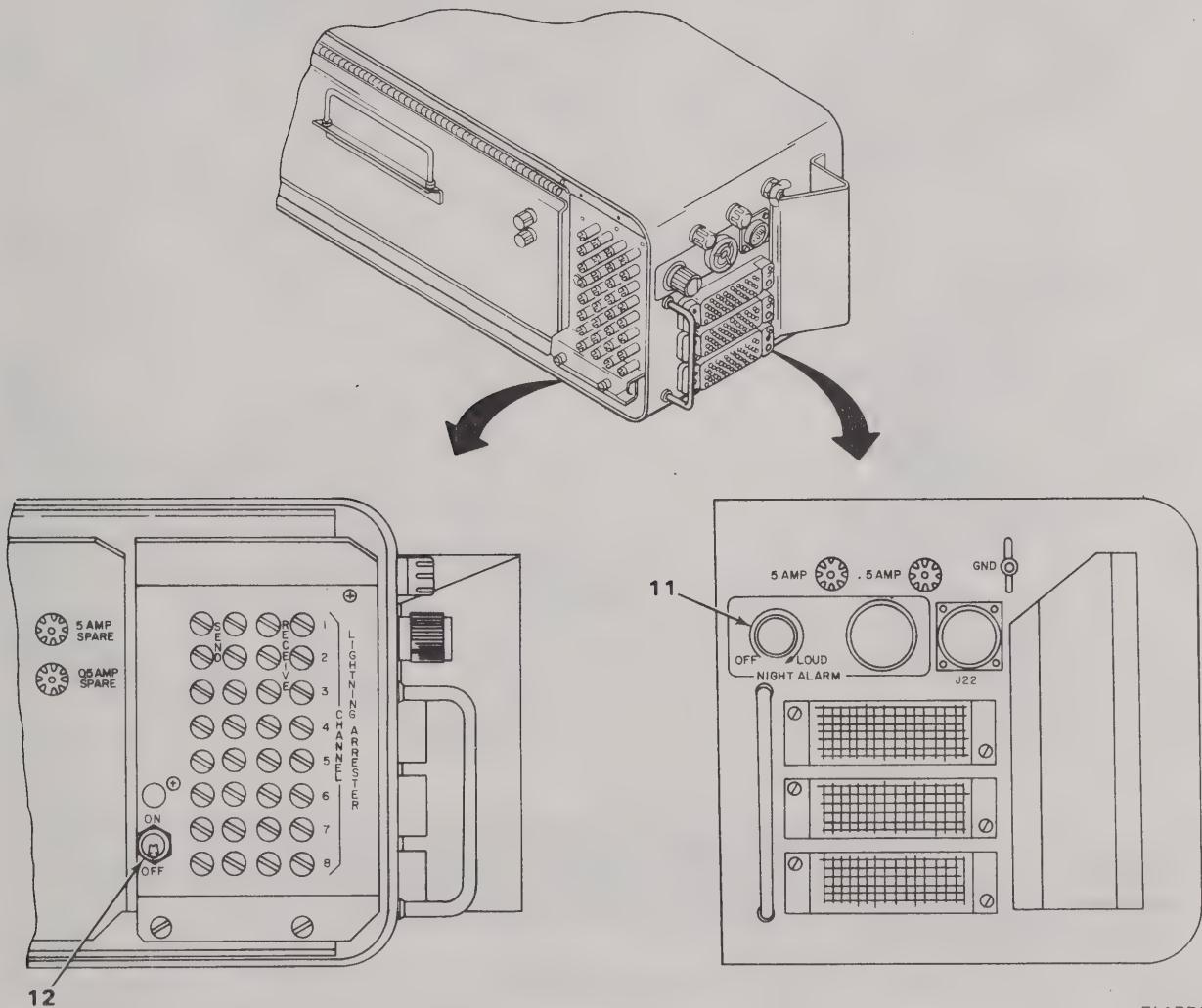
**TOOLS:** Telephone TA-312/PT  
Telephone TA-341B/TT  
Attenuator TS-402/U



EL1RD034

## 5-7. OPERATIONAL PERFORMANCE TEST. (CONT)

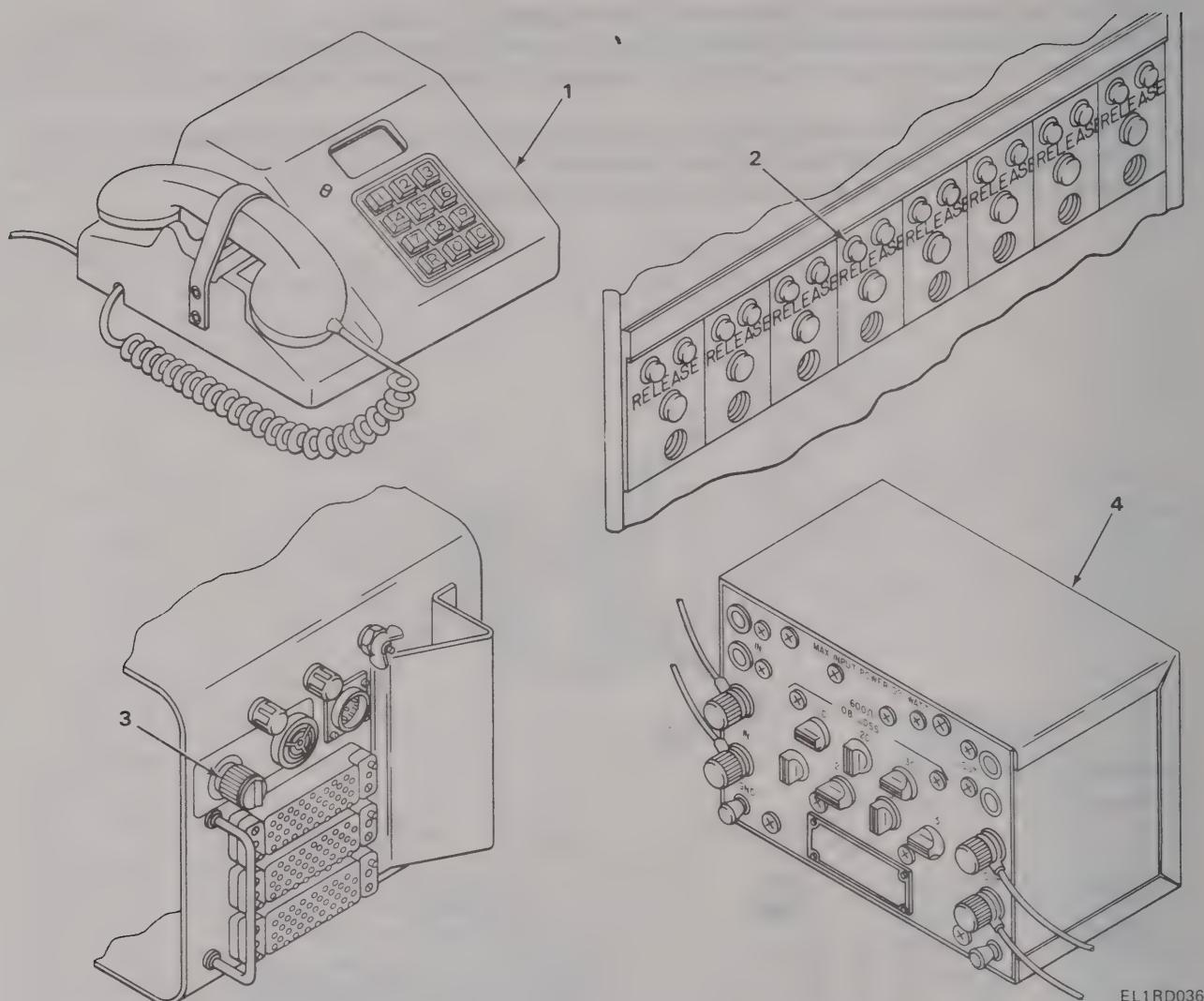
1. Loosen two captive screws (1) and open lightning arrester cover (2).
2. Connect green and black send pair leads (3) of TA 341B/TT (4) to TS-402/U (5).
3. Connect two leads (6) from TS-402/U (5) to terminals TB2-3 and TB2-4 on electronics unit terminal block (7).
4. Connect white or yellow and red receive pair wires (8) of TA 341B/TT (4) to terminals S1A and S1B on electronics unit terminal block (7).
5. Connect TA-312/PT (9) to available two-wire channel in SB-249 (10).



6. Set NIGHT ALARM OFF-LOUD control (11) to OFF.
7. Set power ON/OFF switch (12) to ON.

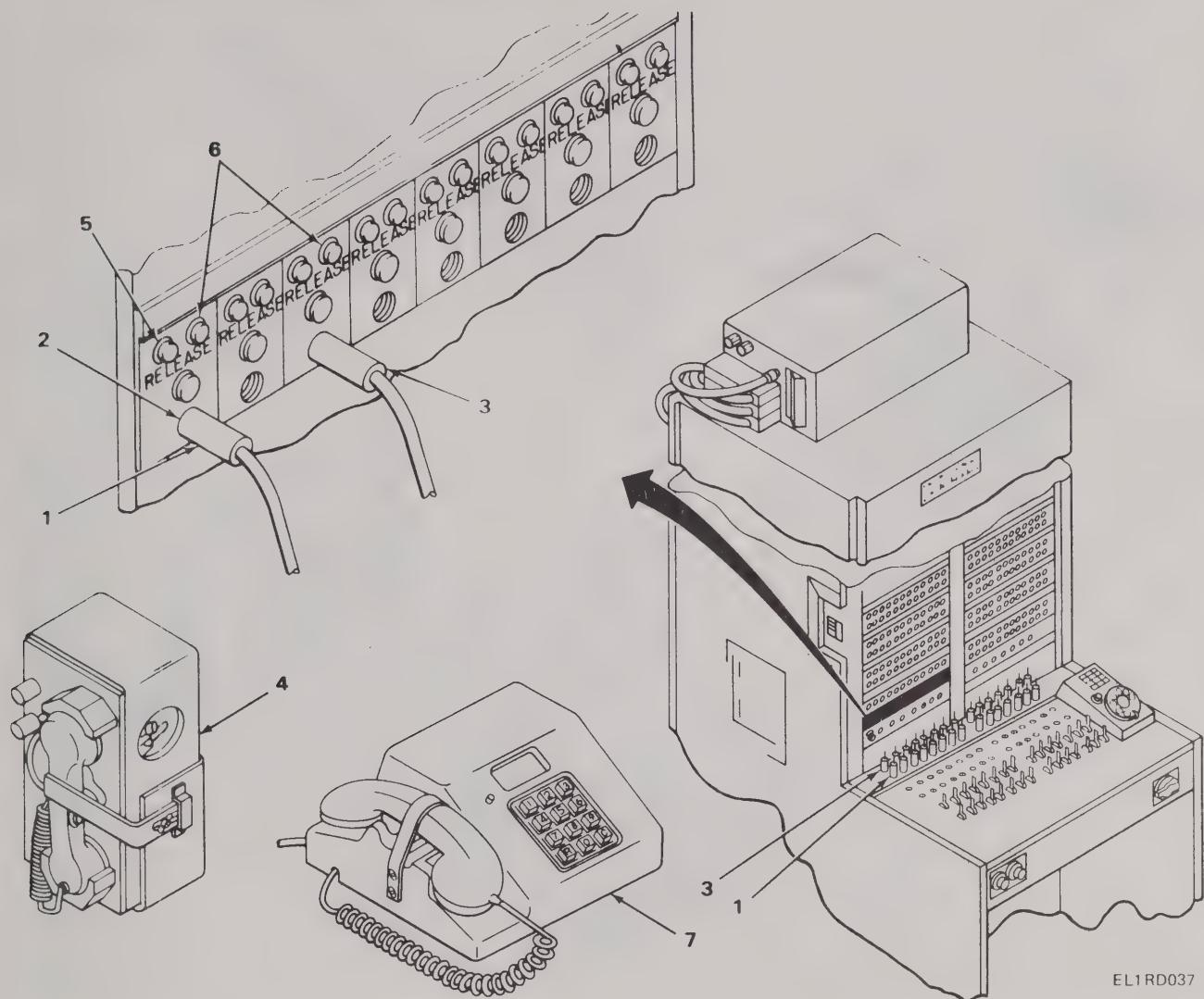
EL1RD03E

## 5-7. OPERATIONAL PERFORMANCE TEST. (CONT)



8. Go off-hook on TA-341B/TT (1) and observe that SR indicator lamp (2) lights.
9. Turn NIGHT ALARM OFF-LOUD control (3) clockwise and verify that audible alarm sounds and gets louder as control is turned. Set volume at comfortable level.
10. Set attenuator (4) to 0 db.

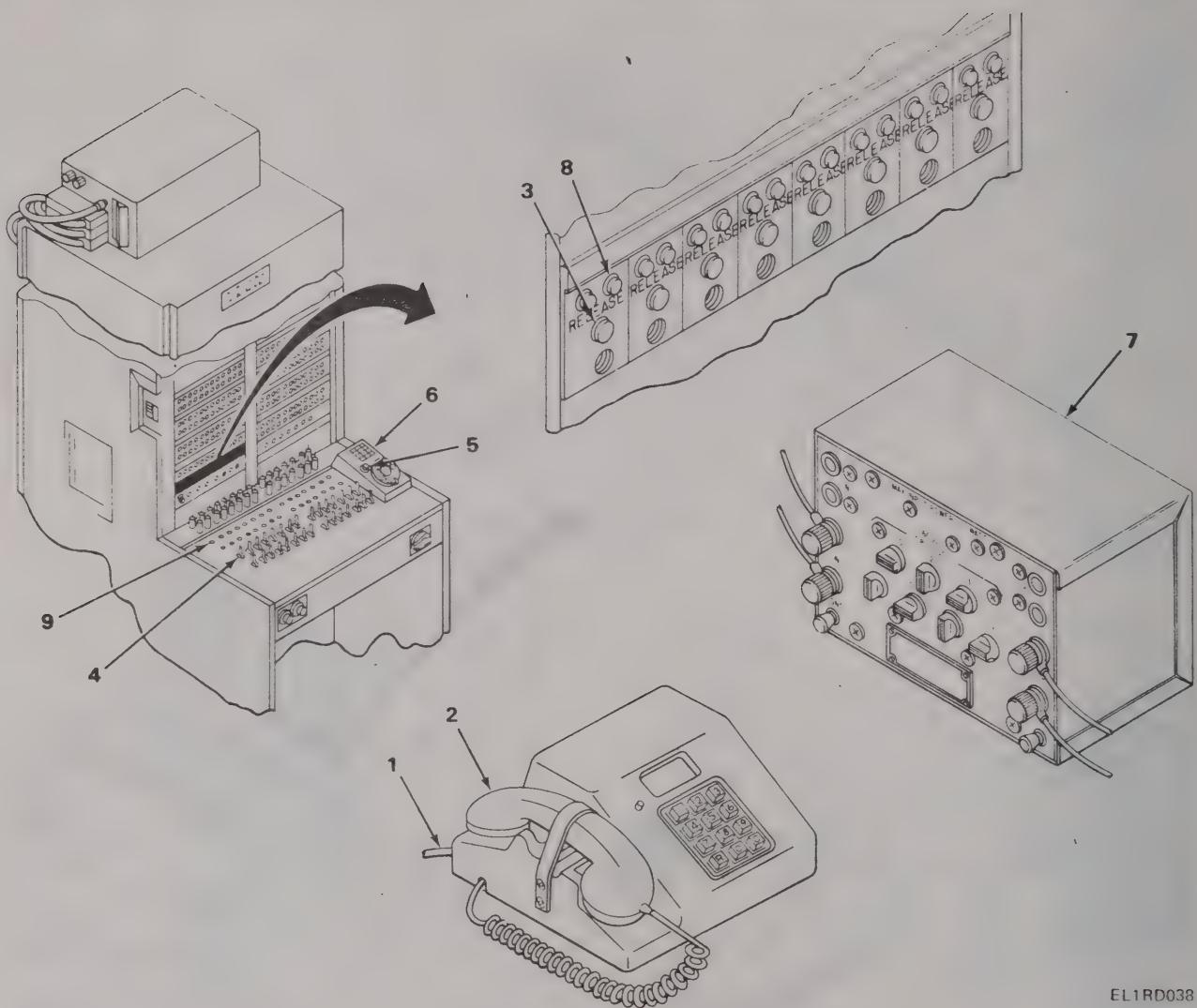
## 5-7. OPERATIONAL PERFORMANCE TEST. (CONT)



EL1RD037

11. Plug call cord (1) into channel jack (2) corresponding to channel being tested.
12. Plug answer cord (3) into channel jack associated with TA-312/PT (4).
13. Verify that when call cord (1) and answer cord (3) are plugged into channel jacks, SR indicator lamp (5) and audible night alarm switch off, and BY indicator lamps (6) light.
14. Go off-hook on TA-312/PT (4) and verify that two-way voice communications exists between TA-312/PT and TA-341B/TT (7).
15. Unplug answer cord (3) from channel jack associated with TA-312/PT (4).

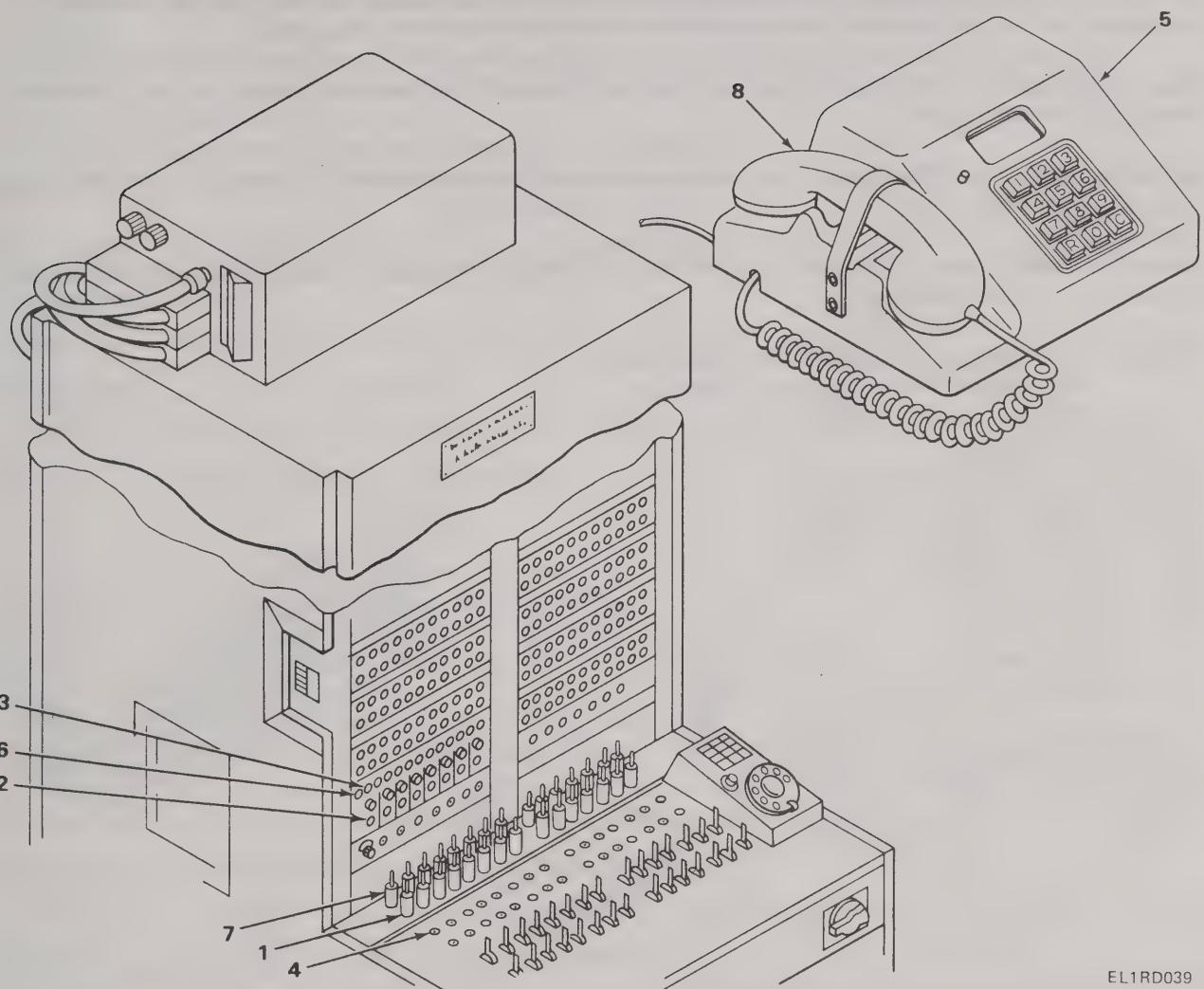
## 5-7. OPERATIONAL PERFORMANCE TEST. (CONT.).



EL1RD038

16. Disconnect TA-341B/TT send pair (1).
17. Listen for release tone in TA-341B/TT handset (2) as you press trunk RELEASE button (3).
18. Set ring answer/dial switch (4) to dial position and listen for seize tone in TA-341B/TT handset (2) as you press SEIZE button (5).
19. Listen for DTMF tones in TA-341B/TT handset (2) as you press each button on keysender (6).
20. Set ring answer/dial switch (4) to normal position and reconnect TA-341B/TT send pair (1).
21. Set TS-402/U (7) to 24 db.
22. Place TA-341B/TT handset (2) on-hook and verify that BY indicator lamp (8) stays lit, SB-249 supervisory lamp (9) lights, and night alarm sounds.

## 5-7. OPERATIONAL PERFORMANCE TEST. (CONT)



EL1RD039

23. Remove call cord (1) from channel jack (2). Verify that BY indicator lamp (3), supervisory lamp (4), and audible night alarm switch off.
24. Go off-hook on TA-341B/TT (5) and verify that SR indicator lamp (6) lights and night alarm sounds.
25. Insert circuit cord (7) into channel jack (2) and verify that SR indicator lamp (6) and audible alarm switch off and BY indicator lamp (3) lights.
26. Place TA-341B/TT handset (8) on-hook momentarily and then go off-hook.
27. Verify that night alarm sounds and supervisory lamp (4) lights when TA-341B/TT handset (8) is placed on-hook and that when handset goes off-hook, SR indicator lamp (6) lights.
28. Remove circuit cord (7) from channel jack (2). Verify that BY indicator lamp (3) and supervisory lamp (4) switch off, and SR indicator lamp (6) and audible night alarm remain on.
29. Insert circuit cord (7) into channel jack (2). Verify that SR indicator lamp (6) and audible night alarm switch off, and BY indicator lamp (3) lights.
30. Repeat steps 8 through 29 for each remaining channel until all eight have been tested.

## 5-8. PRINTED CIRCUIT BOARD AC VOLTAGE MEASUREMENT.

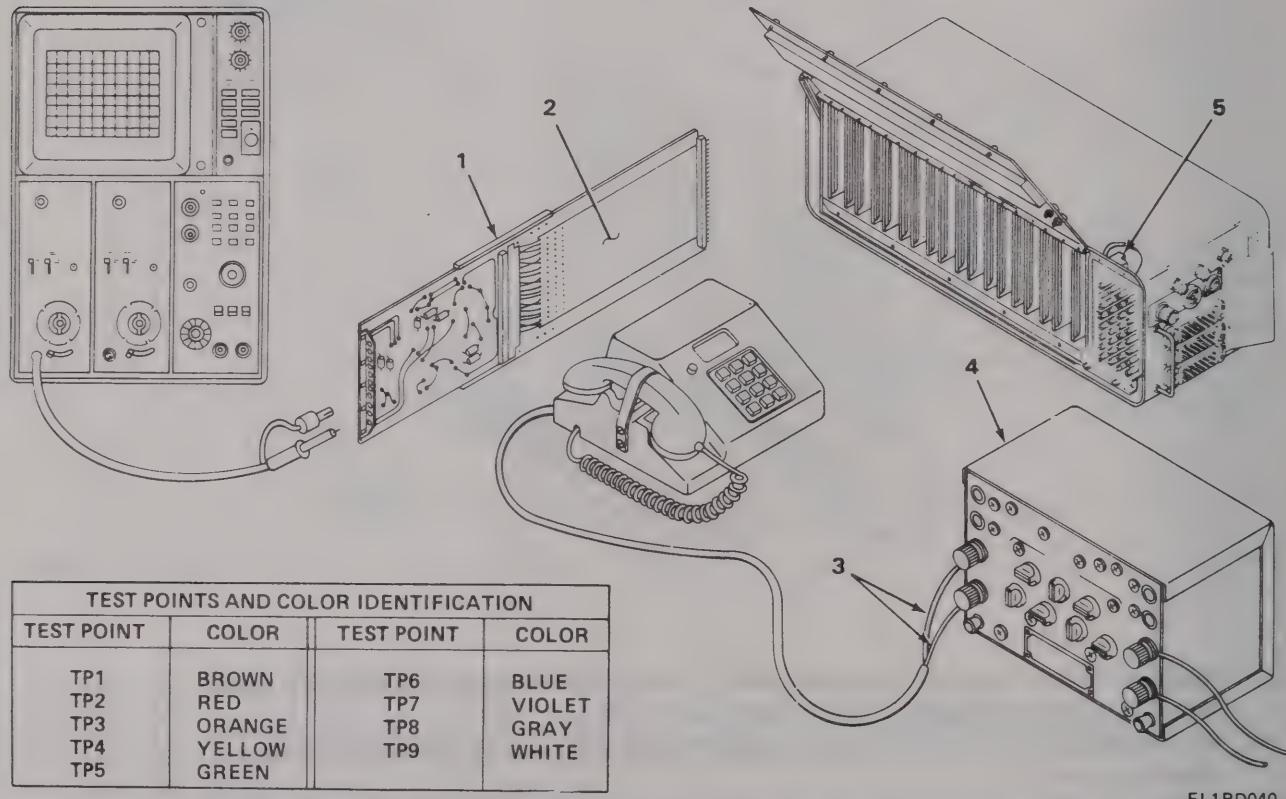
This procedure is designed to assist the technician when troubleshooting the PCB's ac voltage. If necessary, refer to the back of this manual for schematics and wiring diagrams.

The signal frequency is listed as a guide for setting the oscilloscope controls and not as a specific frequency measurement.

All test points on the PCB's are color coded to conform with the standard numerical color code, except 1A10TP3 which is black.

Check voltages at test points first. If additional checking is necessary, place PCB on extender board for access to other terminals.

**TOOLS:** Oscilloscope, AN/USM-281A or equivalent  
Attenuator, TS-402 (\*)U or equivalent  
Extender Board, 210099



EL1RD040

### CAUTION

Make sure equipment power is off before removing or installing any PCB or extender card.

### NOTE

AC voltage is measured peak-to-peak  $\pm$  10 percent.

Signals are single wave unless otherwise specified.

Make sure equipment is complete with normal complement of PCB's.

## 5-8. PRINTED CIRCUIT BOARD AC VOLTAGE MEASUREMENT. (CONT)

1. If needed for access to circuit board terminal pins (1), place board being tested on extender board (2).
2. Connect telephone send pair (3) through attenuator (4) into applicable channel receive binding post (5).
3. Set attenuator (4) to 24 db attenuation.
4. Perform voltage measurements as outlined in ac voltage chart.

## AC VOLTAGE CHART

## TONE GENERATOR 1A9.

TERMINATION	SIGNAL	NOTE
TP1	0.3 v p-p at 425 Hz on -6.0 vdc level	50 ms pulsed sine wave interrupted 2 seconds on, 4 seconds off.
TP2	0.3 v p-p at 2250 Hz on -2.9 vdc level	
TP3	0.3 v p-p at 570 Hz on -2.9 vdc level	
TP4	0.3 v p-p at 2600 Hz on -2.9 vdc level	
TP5	0.6 v p-p at 10 Hz on -5.3 vdc level	
TP6	5.0 v p-p at 10 Hz on -2.85 vdc level	Square wave: interrupted 2 seconds on, 4 seconds off.
TP7	5.1 v p-p at 0.167 Hz on -2.85 vdc level	Square wave. Square wave: 4 seconds high, 2 seconds low.

## ANALOG PRINTED WIRING BOARD 1A1A1 THROUGH 1A8A1.

TERMINATION	SIGNAL	NOTE
TP5	0.2 v at 2250 Hz on -4.7 vdc level	TA-341(*)/TT off hook.

## LOGIC PRINTED WIRING BOARD 1A1A2 THROUGH 1A8A2.

TERMINATION	SIGNAL	NOTE
Pin 9	DTMF TONES	With switchboard call cord plug inserted into trunk unit channel access jack and the ring answer/dial switch in DIAL position, depress any keysender switch on key-call pedestal unit.

## 5-9. PRINTED CIRCUIT BOARD RESISTANCE MEASUREMENTS.

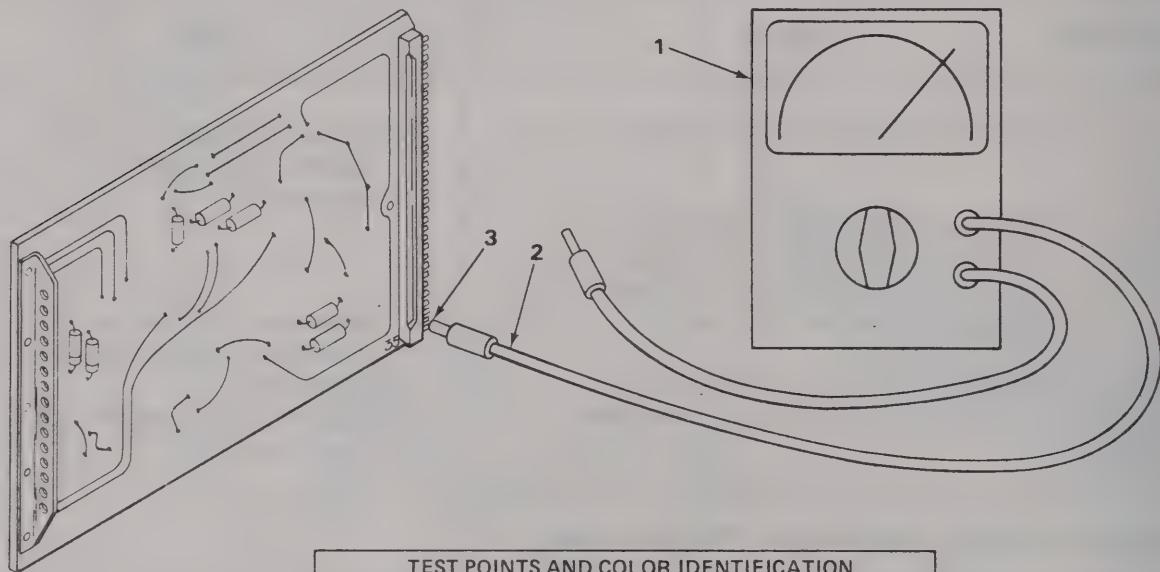
This procedure is designed to assist the technician when troubleshooting PCB's for resistances.

Observe multimeter battery polarity. Damage to transistors or electrolytic capacitors can occur if polarity is reversed.

To prevent short circuits, tape or sleeve test prods or clips. Leave exposed only the area needed to make contact with circuit under test.

All test points on the PCB's are color coded to conform with the standard numerical color codes, except 1A10TP3 which is black.

TOOLS: Multimeter, TS-352 B/U or equivalent



TEST POINTS AND COLOR IDENTIFICATION			
TEST POINT	COLOR	TEST POINT	COLOR
TP1	BROWN	TP6	BLUE
TP2	RED	TP7	VIOLET
TP3	ORANGE	TP8	GRAY
TP4	YELLOW	TP9	WHITE
TP5	GREEN		

EL1RD041

### CAUTION

Turn power off before removing or installing PCB's.

Remove PCB from equipment for all resistance measurements.

1. Unless otherwise specified, configure multimeter (1) in RX100 scale.
2. Place negative probe (2) on pin 35 (3) of PCB under test.
3. Perform resistance tests as outlined in resistance measuring table.

## 5-9. PRINTED CIRCUIT BOARD RESISTANCE MEASUREMENTS. (CONT)

## RESISTANCE MEASUREMENTS

PIN NO.	1A1 THROUGH 1A8		TONE GENERATOR 1A9	COMMON 1A10
	ANALOG A1	LOGIC A2		
1	1900	1900	28K <sup>1</sup>	(TP1) 1300
2				1300
3				1300
4				1300
5		INF		1300
6	3200	35K <sup>1</sup>	28K <sup>1</sup>	(TP2) 45K <sup>1</sup>
7				45K <sup>1</sup>
8	(TP5) 1500	55K <sup>1</sup>		45K <sup>1</sup>
9		2900		45K <sup>1</sup>
10	INF	INF	270K <sup>1</sup>	45K <sup>1</sup>
11		INF	260K <sup>1</sup>	
12	INF	INF	270K <sup>1</sup>	
13		INF	270K <sup>1</sup>	
14	(TP4) 40K <sup>1</sup>	30K <sup>1</sup>		
15	(TP2) 40K <sup>1</sup>	35K <sup>1</sup>		
16	(TP3) 40K <sup>1</sup>	35K <sup>1</sup>		
17		60K <sup>1</sup>		
18		280K <sup>1</sup>		
19		INF		
20		INF		
21		INF		
22		30K <sup>1</sup>		1300
23				
24	INF			
25				
26		25K <sup>1</sup>		
27				
28				
29				
30				
31				
32		0		
33		0		0
34		0		(TP3) 0
35	0	0	0	0
	(TP1) 2500	(TP1) 1300	(TP1) 35K <sup>1</sup>	
			(TP2) 30K <sup>1</sup>	
			(TP3) 30K <sup>1</sup>	
			(TP4) 30K <sup>1</sup>	
			(TP5) 35K <sup>1</sup>	
			(TP6) 30K <sup>1</sup>	
			(TP7) 30K <sup>1</sup>	

<sup>1</sup>Use R x 10000 scale.

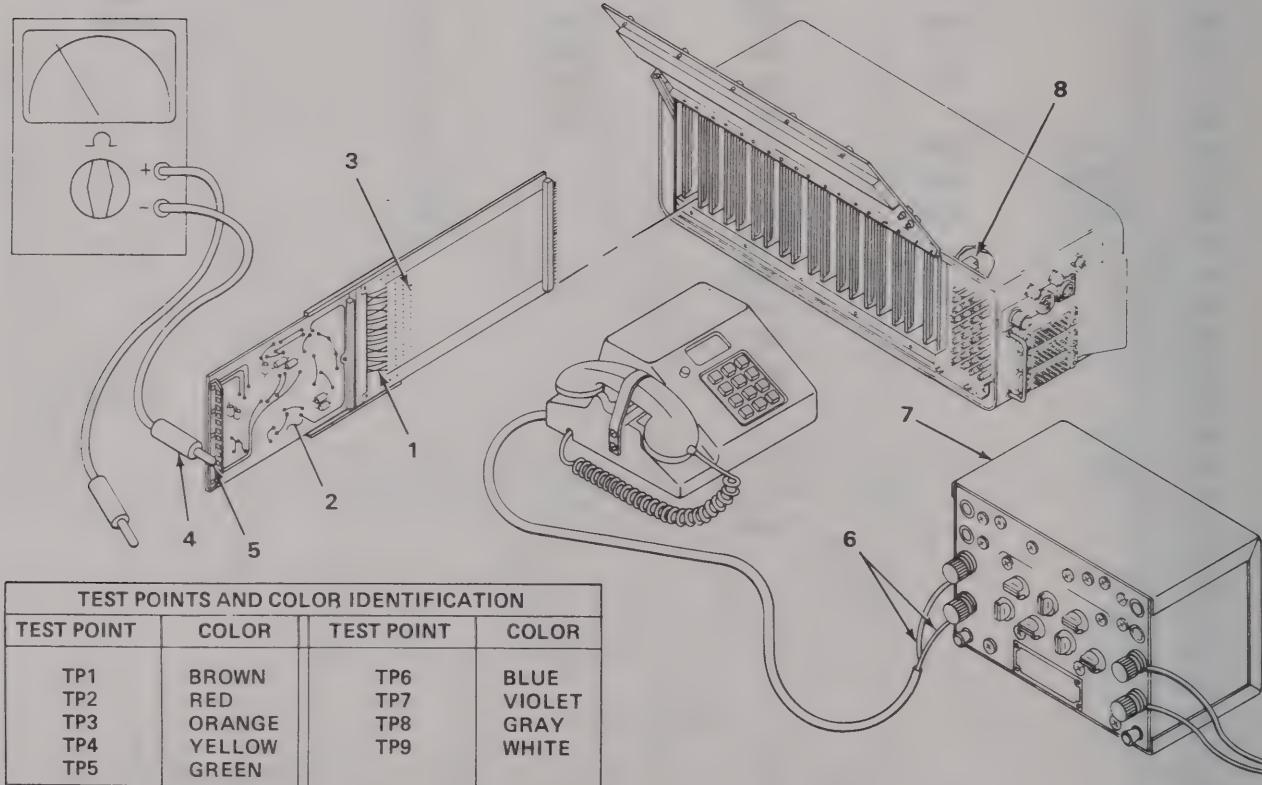
## 5-10. PRINTED CIRCUIT BOARD DC VOLTAGE MEASUREMENTS.

To prevent short circuits, tape or sleeve test prods or clips. Leave exposed only the area needed to make contact with circuit under test.

All test points on the PCB's are color coded to conform with the standard numerical color code, except 1A10TP3 which is black.

Check voltages at test points first. If additional checking is necessary, place PCB on extender board for access to other terminals.

**TOOLS:** Multimeter, TS 352B/U or equivalent  
 Attenuator, TS-402 (\*)/U  
 Extender Board, 210099  
 Telephone Set, TA-341B/TT



**5-10. PRINTED CIRCUIT BOARD DC VOLTAGE MEASUREMENTS. (CONT)****CAUTION**

Make sure equipment power is off before removing or installing any PCB or extender board.

**NOTE**

All voltages are negative in respect to ground,  $\pm$  10 percent.

All circuits are in the reset state unless otherwise specified.

Make sure equipment is complete with normal complement of PCB's.

Idle condition is when incoming or outgoing signals are absent, SR and BY indicator lamps are switched off, and cords are removed from channel access jacks.

1. If needed for access to terminal pins (1), place circuit board (2) being tested on extender board (3).
2. Place negative probe (4) on TP3 of common printed wiring board 1A10(5).
3. Connect telephone send pair (6) through attenuator (7) and into applicable channel RECEIVE binding post (8).
4. Set attenuator (7) for 24 db attenuation.

## 5-10. PRINTED CIRCUIT BOARD DC VOLTAGE MEASUREMENTS. (CONT)

## DC VOLTAGE MEASUREMENTS

PIN NO.	1A1 THROUGH 1A8				1A9 TONE GENERATOR	1A10 COMMON		
	ANALOG A1		LOGIC A2					
	IDLE	ACTIVE	IDLE	ACTIVE				
1	6.0		6.0		6.0	6.0 (TPI)		
6	3.0		3.0		3.0	3.0 (TP2)		
8	(TP5) 5.0		5.0					
10			0.0	4.4 <sup>d</sup>				
11			0.0	4.4 <sup>e</sup>				
12			0.0	4.5 <sup>b,c</sup>				
13			0.0	4.4 <sup>f</sup>				
14	(TP4) 5.6	0.0 <sup>a</sup>	5.6	0.0 <sup>a</sup>				
15	(TP2) 5.3	0.0 <sup>b</sup>	5.3	0.0 <sup>b</sup>				
16	(TP3) 5.4	0.0 <sup>c</sup>	5.4	0.0 <sup>c</sup>				
17		0.0	5.7 <sup>f</sup>					
18		0.0	5.7 <sup>g</sup>					
19		5.4	0.5 <sup>b,U</sup>					
20		0.0	44.0 <sup>g</sup>					
22		48.0						
24		0.0	44.0 <sup>c</sup>					
26		5.7	0.0					
34								
35	(gnd) 0.0		(gnd) 0.0		(gnd) 0.0 (TP1) <sup>h</sup> (TP2) 2.9 (TP3) 2.9 (TP4) 2.9 (TP5) <sup>h</sup> (TP6) <sup>h</sup> (TP7) <sup>h</sup>	(TP3) gnd		

a. Place logic printed circuit board of same channel under test on extender board. Connect pin 12 of extender board to TP5 of analog printed wiring board under test.

b. With switchboard plug inserted into trunk unit channel access jack, place TA-341(\*)/TT on hook. The release tone time duration is determined by the TA-341(\*)/TT release timer circuit. Reset to IDLE by removing switchboard plug from channel access jack.

c. Take TA-341(\*)/TT off hook. Reset to IDLE by inserting and removing switchboard plug at trunk unit channel access jack.

d. Take TA-341(\*)/TT off hook. Return TA-341(\*)/TT on hook. Reset IDLE by inserting and removing switchboard plug at trunk unit channel access jack.

e. With switchboard plug removed from trunk unit channel access jack, depress RELEASE pushbutton. Release tone time duration is from 3 to 10 seconds.

f. With switchboard (call cord) plug inserted into trunk unit channel access jack and ring answer/dial switch in DIAL position, depress SEIZE pushbutton on keycall pedestal unit.

g. Insert switchboard plug into trunk unit channel access jack.

h. See ac voltage chart in paragraph 5-8.

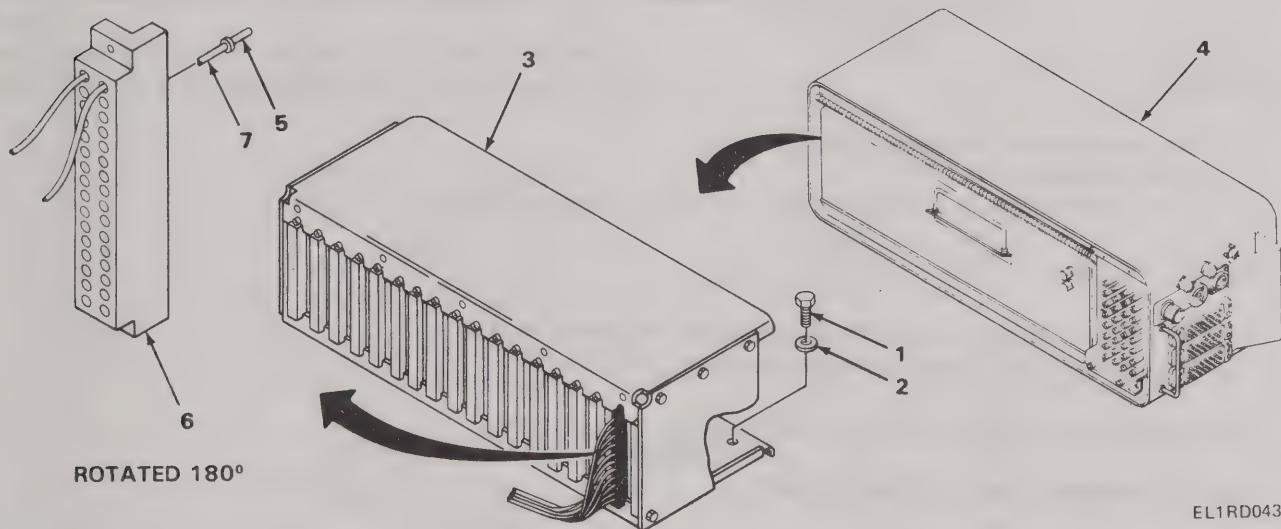
## 5-11. PRINTED CIRCUIT BOARD CONNECTOR PIN REPLACEMENT.

The electronics unit has 18 connectors. The replacement for each connector is identical. Make sure you replace a connector with the same type that was removed.

TOOLS: Pin Extraction Tool, 465199-1  
Pin Crimping Tool, 90083

MATERIALS/PARTS: Electric Receptacle Connector, SMC743753-1  
Electric Receptacle Connector, SMC743753-3  
Electric Receptacle Connector, SMC743753-4  
Electric Receptacle Connector, SMC743753-8

PRELIMINARY PROCEDURE: Remove all circuit boards.



### REMOVAL

1. Remove 20 screws (1) and flat washers (2) along sides and bottom of card cage (3).
2. Carefully pull card cage (3) from electronics unit (4) until wiring harness unfolds.
3. Pull defective connector pin (5) from connector (6) with pin extractor tool.
4. Cut wire (7) as close to defective connector pin (5) body as possible. Discard connector pin.

### INSTALLATION

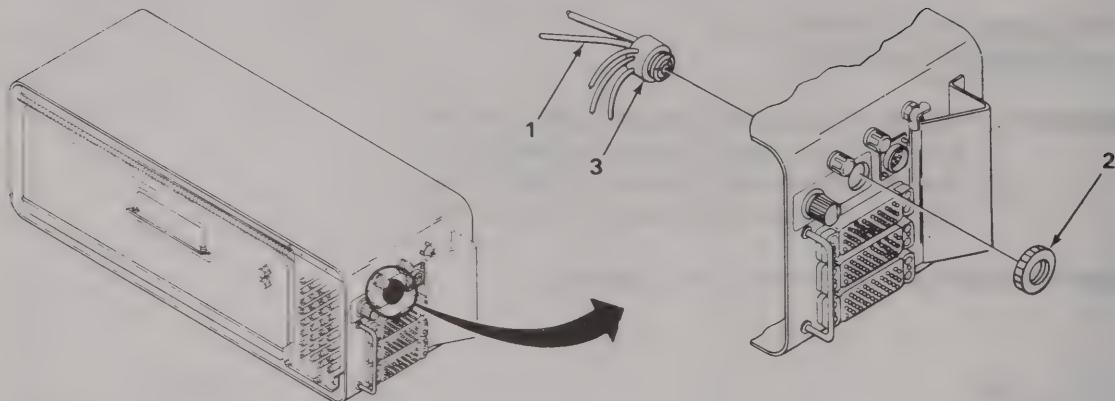
1. Crimp wire (7) to replacement pin with crimping tool.
2. Insert wired pin (5) into connector (6) until seated firmly.
3. Carefully insert card cage (3) into electronics unit (4) making sure not to pinch any wires.
4. Position card cage (3) in place and secure with 20 screws (1) and flat washers (2).

FOLLOW-ON MAINTENANCE: Reinstall circuit boards.

**5-12. NIGHT ALARM HORN REPLACEMENT.**

MATERIALS/PARTS: Electrical Horn, SC628P

PRELIMINARY PROCEDURE: Open electronics unit rear cover.



EL1RD044

**REMOVAL**

1. Tag horn wires (1) for identification.
2. Unsolder wires (1).
3. Turn night alarm mounting ring (2) to left and remove horn (3).

**INSTALLATION**

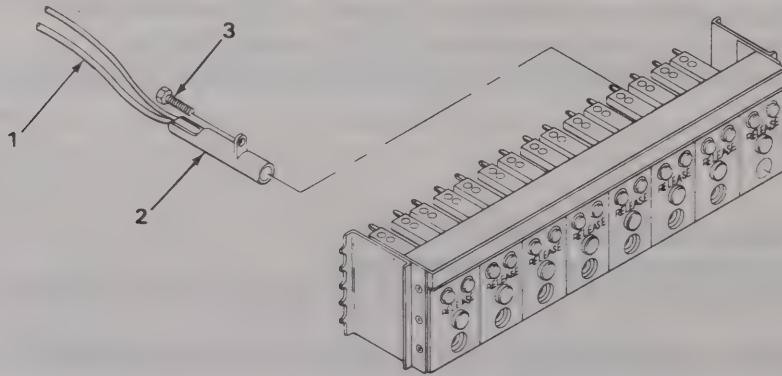
1. Position horn (3) in place and secure with mounting ring (2).
2. Solder wires (1) to horn (3). Remove tags.

FOLLOW-ON MAINTENANCE: Close electronics unit rear cover.

**5-13. CHANNEL JACK REPLACEMENT.**

MATERIALS/PARTS: Telephone Jack, JJ074 C-Frame

PRELIMINARY PROCEDURE: Remove trunk unit panel assembly.



EL1RD045

## 5-13. CHANNEL JACK REPLACEMENT. (CONT)

### REMOVAL

1. Tag wires (1) for identification.
2. Unsolder wires (1) from jack (2).
3. Remove screw (3) and jack (2).

### INSTALLATION

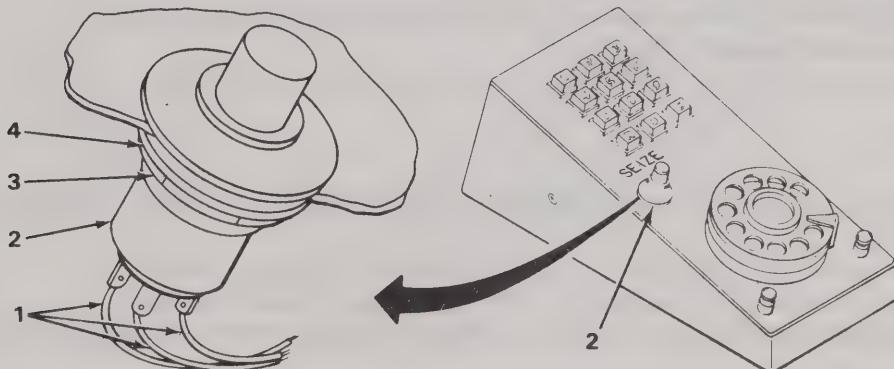
1. Position jack (2) in place and secure with screw (3).
2. Solder wires (1) to jack (2) as tagged. Remove tags.

FOLLOW-ON MAINTENANCE: Reinstall trunk unit panel assembly.

## 5-14. SEIZE PUSHBUTTON REPLACEMENT.

MATERIALS/PARTS: Push Switch, SMC 743755-1

PRELIMINARY PROCEDURE: Open keycall pedestal cover.



EL1RD046

### REMOVAL

1. Tag wires (1) for identification.
2. Unsolder wires (1) from switch (2).
3. Remove nut (3), washer (4) and switch (2).

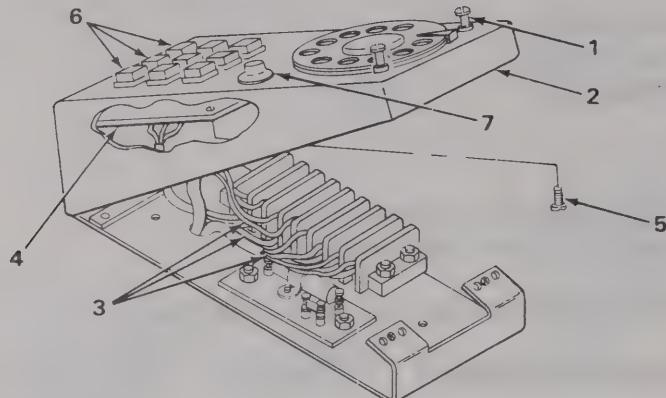
### INSTALLATION

1. Position switch (2) in place and secure with nut (3) and washer (4).
2. Solder wires (1) to switch (2) as tagged. Remove tags.

FOLLOW-ON MAINTENANCE: Close keycall pedestal cover.

## 5-15. KEYSENDER AND OSCILLATOR ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Keysender and Oscillator Assembly, SMC 743868



EL1RD047

## REMOVAL

1. Release two captive screws (1) in keycall pedestal cover (2).
2. Tilt keycall pedestal cover (2) up and back.
3. Tag four wires (3) connected to keysender and oscillator assembly (4).
4. Unsolder four tagged wires (3) only.
5. Remove two screws (5) and keysender and oscillator assembly (4).

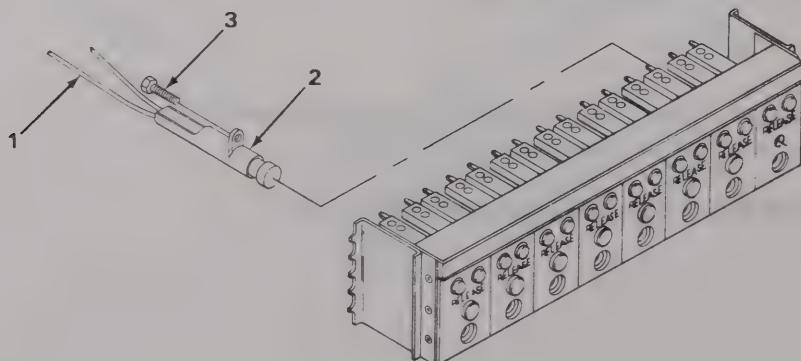
## INSTALLATION

1. Align keysender and oscillator assembly (4) with digit keys 1, 2 and 3 (6) away from SEIZE button (7).
2. Secure keysender and oscillator assembly (4) with two screws (5).
3. Solder four wires (3) to keysender and oscillator assembly (4) as tagged.
4. Lower keycall pedestal cover (2) into position and secure with two captive screws (1).

## 5-16. RELEASE SWITCH REPLACEMENT.

MATERIALS/PARTS: Switch, 11003

PRELIMINARY PROCEDURE: Remove trunk unit panel assembly.



EL1RD048

## 5-16. RELEASE SWITCH REPLACEMENT. (CONT)

### REMOVAL

1. Tag wires (1) for identification.
2. Unsolder wires (1) from switch (2).
3. Remove screw (3) and switch (2).

### INSTALLATION

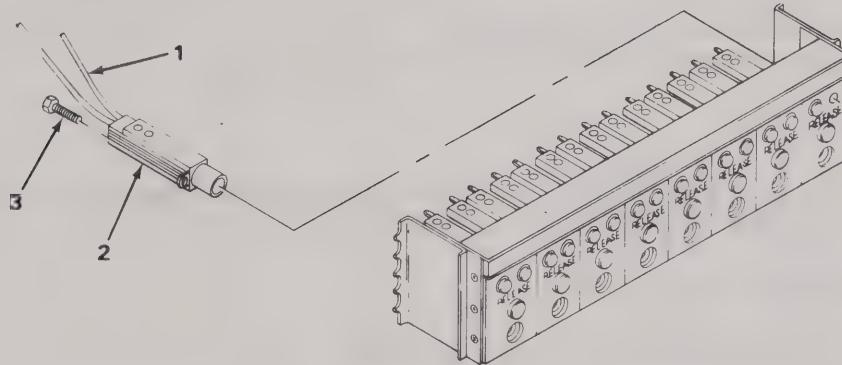
1. Position switch (2) in place and secure with screw (3).
2. Solder wires (1) to switch (2) as tagged. Remove tags.

FOLLOW-ON MAINTENANCE: Reinstall trunk unit panel assembly.

## 5-17. LAMPHOLDER REPLACEMENT.

MATERIALS/PARTS: Lampholder, SMC 743590

PRELIMINARY PROCEDURE: Remove trunk unit panel assembly.



EL1RD049

### REMOVAL

1. Tag defective lampholder wires (1) for identification.
2. Unsolder wires (1) from lampholder (2).
3. Remove screw (3) and lampholder (2).

### INSTALLATION

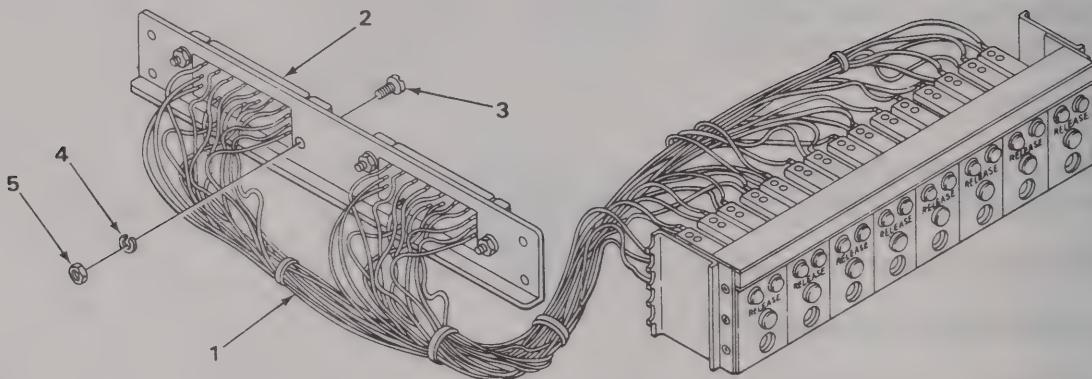
1. Position lampholder (2) in place and secure with screw (3).
2. Solder wires (1) to lampholder (2) as tagged. Remove tags.

FOLLOW-ON MAINTENANCE: Reinstall trunk unit panel assembly.

**5-18. TRUNK UNIT CONNECTOR REPLACEMENT.**

MATERIALS/PARTS: Connector

PRELIMINARY PROCEDURE: Remove trunk unit.



EL1RD050

**REMOVAL**

1. Tag wires (1) for identification.
2. Unsolder wires (1) from defective connector (2).
3. Remove two screws (3), lockwashers (4), nuts (5) and connector (2).

**INSTALLATION**

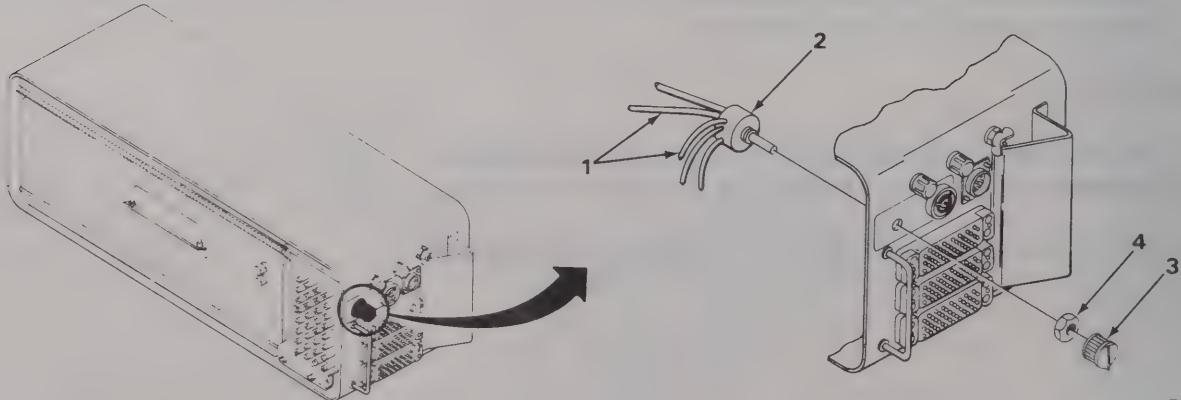
1. Position connector (2) in place and secure with two screws (3), lockwashers (4) and nuts (5).
2. Solder wires (1) to connector (2) as tagged. Remove tags.

FOLLOW-ON MAINTENANCE: Reinstall trunk unit.

**5-19. NIGHT ALARM OFF-LOUD CONTROL REPLACEMENT.**

MATERIALS/PARTS: Control

PRELIMINARY PROCEDURE: Open electronics unit rear cover.



EL1RD051

## 5-19. NIGHT ALARM OFF-LOUD CONTROL REPLACEMENT. (CONT)

### REMOVAL

1. Tag wires (1) for identification.
2. Unsolder wires (1) from control (2).
3. Remove control knob (3), nut (4) and control (2).

### INSTALLATION

1. Position control (2) in place and secure with nut (4).
2. Solder wires (1) to control (2) as tagged. Remove tags.
3. Install control knob (3).

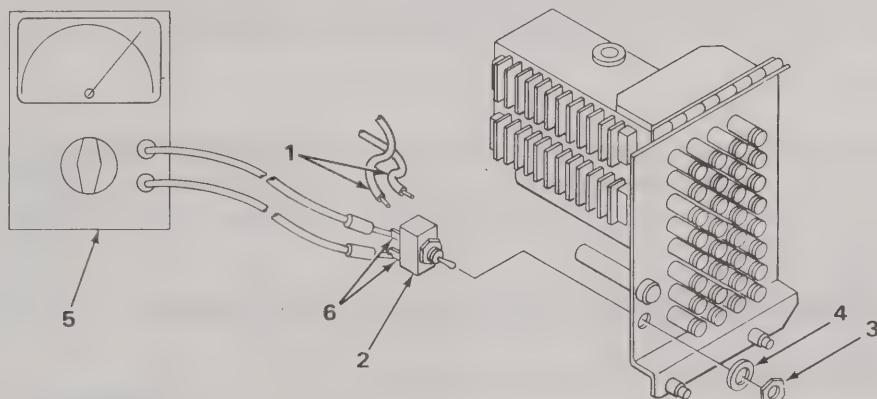
FOLLOW-ON MAINTENANCE: Close electronics unit rear cover.

## 5-20. POWER SWITCH TEST AND REPLACEMENT.

TOOLS: Multimeter TS-352B/U or equivalent

MATERIALS/PARTS: Toggle Switch, MS 35058-22

PRELIMINARY PROCEDURE: Open electronics unit rear cover.



EL1RD052

### REMOVAL

1. Tag wires (1) for identification.
2. Unsolder wires (1) from switch (2).
3. Remove nut (3), washer (4) and switch (2).

### TEST

1. Set multimeter (5) for continuity test.
2. Set switch (2) to ON and check terminals (6) for continuity.
3. If switch (2) tests open, replace switch.

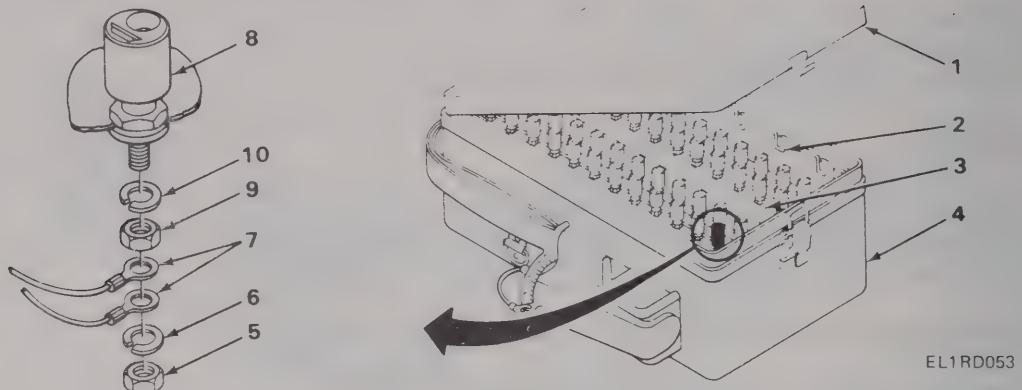
### INSTALLATION

1. Position switch (2) in place and secure with nut (3) and washer (4).
2. Solder wires (1) to switch (2) as tagged. Remove tags.

FOLLOW-ON MAINTENANCE: Close electronics unit rear cover.

## 5-21. DISTRIBUTION BOX BINDING POST ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Binding post assembly



EL1RD053

## REMOVAL

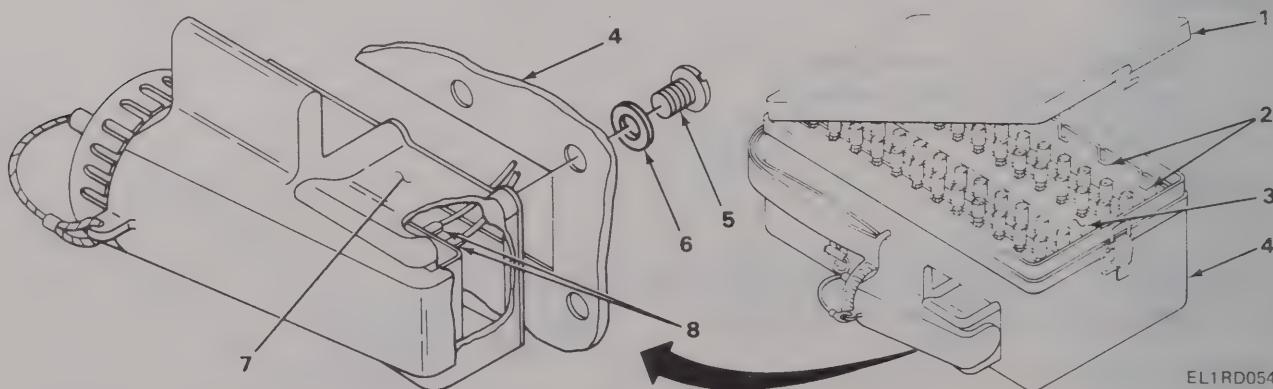
1. Open distribution box cover (1).
2. Remove 16 screws (2) and gently lift binding post assembly panel (3) from distribution box (4).
3. Remove nut (5), lockwasher (6) and wires (7) from binding post assembly (8).
4. Remove nut (9), lockwasher (10) and binding post assembly (8).

## INSTALLATION

1. Position binding post assembly (8) in place and secure with lockwasher (10) and nut (9).
2. Connect wires (7) with lockwasher (6) and nut (5) onto binding post assembly (8).
3. Position binding post assembly panel (3) in place and secure with 16 screws (2).
4. Close distribution box cover (1).

## 5-22. DISTRIBUTION BOX CONNECTOR RECEPTACLE REPLACEMENT.

MATERIALS/PARTS: Connector Receptacle, U-187A/G



EL1RD054

## 5-22. DISTRIBUTION BOX CONNECTOR RECEPTACLE REPLACEMENT. (CONT)

### REMOVAL

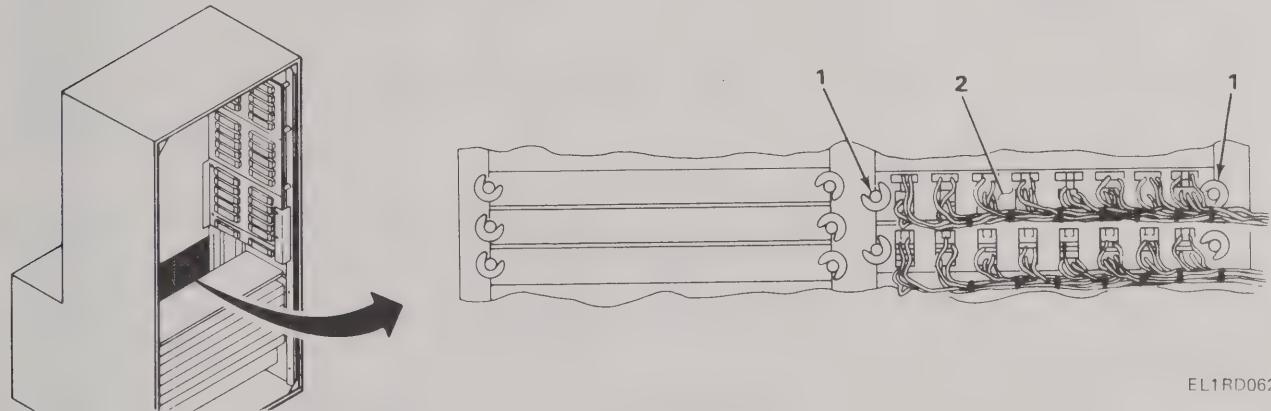
1. Open distribution box cover (1).
2. Remove 16 screws (2) and gently lift binding post assembly panel (3) from distribution box (4).
3. Remove six screws (5) and lockwashers (6) and gently pull connector receptacle (7) from distribution box (4).
4. Tag wires (8) for identification.
5. Unsolder wires (8) and remove connector receptacle (7).

### INSTALLATION

1. Solder wires (8) to connector receptacle (7) as tagged. Remove tags.
2. Secure connector receptacle (7) to distribution box (4) with six screws (5) and lockwashers (6).
3. Position binding post assembly panel (3) in place and secure with 16 screws (2).
4. Close distribution box cover (1).

## 5-23. TRUNK UNIT PANEL ASSEMBLY REMOVAL.

The primary purpose for removing the trunk unit panel assembly is to provide the technician with access to panel mounted components for maintenance purposes.



### REMOVAL

Working from rear of switchboard, remove two half-disk fasteners (1) and trunk unit panel assembly (2).

### INSTALLATION

Position trunk unit panel assembly (2) in place and secure with two half-disk fasteners (1).



## APPENDIX A

### REFERENCES

#### **A-1. SCOPE.**

The following is a list of pamphlets, forms, service bulletins and technical manuals referenced in or related to this manual.

#### **A-2. PAMPHLETS.**

Consolidated Index of Army Publications and Blank Forms .....	DA PAM 310-1
The Army Maintenance Management System (TAMMS) .....	DA PAM 738-750

#### **A-3. FORMS.**

Recommended Changes to Publications and Blank Forms.....	DA FORM 2028
Discrepancy in Shipment Report (DISREP) .....	SF-361
Report of Discrepancy (ROD) .....	SF-364
Quality Deficiency Report .....	SF-368

#### **A-4. SERVICE BULLETINS.**

Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army .....	SB 38-100
Solder and Soldering.....	TG SIG 222
Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters .....	TB 43-0118

#### **A-5. TECHNICAL MANUALS.**

Attenuators TS-402/U and TS-402A/U .....	TM 11-2044
Central Office, Telephone Manual AN/TCC-7 and AN/TCC-7A and Telephone Central Office Group, Manual AN/GTA-14(V) .....	TM 11-2146
Operator and Organizational Maintenance Manual, Including Repair Parts and Special Tool Lists: Telephone Set TA-312/PT. (TO 31W1-2PT-291).....	TM 11-5805-201-12
Operator's, Organizational, Direct Support and General Support Maintenance Manual: Central Offices, Telephone, Manual, AN/MTC-1 (NSN 5805-00-926-0255) and AN/MTC-1A (NSN 5805-00-167-7628).....	TM 11-5805-284-14
Organizational, DS, GS, and Depot Maintenance Manual, Including Repair Parts and Special Tools Lists: Central Office, Telephone, Manual AN/MTC-9 .....	TM 11-5805-288-15
Operator's and Organizational Maintenance Manual, Including Repair Parts and Special Tools Lists: Telephone Sets TA-341/TT and TA-341A/TT. FSN 5805-910-8844 (NAVELEX 0967-456-9010) .....	TM 11-5805-384-12
Operator, Organizational, DS, GS, and Depot Maintenance Manual, Including Repair Parts and Special Tool Lists: Central Office, Telephone, Manual AN/TTC-23.....	TM 11-5805-391-15

**A-5. TECHNICAL MANUALS. (CONT)**

Organizational and Direct Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Converters, Telephone Signal CV-1918A(V)1/G (NSN 5805-00-504-9103) CV-1918A(V)2/G (NSN 5805-00-504-9107) and CV-1918A(V)3/G (NSN 5805-00-137-7674).....	TM 11-5805-553-23P
Operator's and Organizational Maintenance Manual: Central Office, Telephone, Automatic AN/TTC-38(V)(*).....	TM 11-5805-628-12
Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U .....	TM 11-6625-366-15
Operator, Organizational, DS, GS, and Depot Maintenance Manual, Including Repair Parts and Special Tool Lists: Oscilloscope AN/USM-281A .....	TM 11-6625-1703-15
Administrative Storage of Equipment.....	TM 740-90-1
Procedures for Destruction of Electronics Materiel To Prevent Enemy Use (Electronics Command).....	TM 750-244-2

## APPENDIX B

### MAINTENANCE ALLOCATION

#### Section I INTRODUCTION

##### **B-1. GENERAL.**

This appendix provides a summary of maintenance operations for CV-1918A converter. It authorizes categories of maintenance for specific maintenance functions on repairable items and components, and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

##### **B-2. MAINTENANCE FUNCTIONS.**

Maintenance functions will be limited to and defined as follows:

- a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.
- b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- c. Service. Operations required periodically to keep an item in proper operating condition, ie, to clean (decontaminate); preserve; drain; paint; or replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.
- d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.
- e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.
- f. Calibrate. To determine and cause corrections to be made or adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
- g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.
- h. Replace. The act of substituting a serviceable-like-type part, subassembly, or module (component or assembly) for an unserviceable counterpart.
- i. Repair. The application of maintenance services (inspect, test, service, adjust, aline, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

**B-2. MAINTENANCE FUNCTIONS. (CONT)**

- j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards in appropriate technical publications (ie, DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to a like-new condition.
- k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc) considered in classifying Army equipment/components.

**B-3. COLUMN ENTRIES.**

- a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.
- b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.
- c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for the purpose of having group numbers in the MAC and RPSTL coincide.
- d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn (s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance categories, appropriate "worktime" figures will be shown for each category. The "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C	-	Operator/Crew
O	-	Organizational
F	-	Direct Support
H	-	General Support
D	-	Depot

- e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.
- f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

**B-4. TOOL AND TEST EQUIPMENT REQUIREMENTS (SECTION III).**

- a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.
- b. Maintenance Category. The codes in this column indicate the maintenance category allocated to the tool or test equipment.
- c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.
- d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.
- e. Tool Number. This column lists the manufacturer's part number of the tool followed by the (five-digit) Federal Supply Code for manufacturers (FSCM) in parentheses.

**B-5. REMARKS (SECTION IV).**

- a. Reference Code. This code refers to the appropriate item in section II, column 6.
- b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

## Section II MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS	
			C	O	F	H	D			
00	TELEPHONE SIGNAL CONVERTER	Inspect	0.2							
		Test	0.5							A
		Service	0.2							B
		Install		2.0					18	
		Repair	0.3						1,2,18	C
		Replace	1.0						11	F
		Repair						2.0	3,4,6, 9 thru 17	
01	ELECTRONIC UNIT	Overhaul					5.0		1 thru 4, 6 thru 17	
		Inspect	0.1							
		Test	0.1							
		Test			0.2				3 thru 8, 11	A G
		Replace	0.2						11	F
		Repair	0.1						1,2,18	C
		Repair			1.0				3 thru 11	E
0101	Frame and Connector Assembly	Replace			0.2				11	
		Repair			1.0				11	D
0102	Circuit Card, Channel Logic	Replace			0.1				8,11 3,4,6, 9 thru 17	
		Repair						2.0		
0103	Circuit Card, Tone Generator	Replace			0.1				8,11 3,4,6, 9 thru 17	
		Repair						2.0		
0104	Circuit Card Channel Analog	Replace			0.1				8,11 3,4,6, 9 thru 17	
		Repair						2.0		
0105	Circuit Card, Common Regulator	Replace			0.1				8,11 3,4,6, 9 thru 17	
		Repair						2.0		
02	KEYCALL PEDESTAL	Inspect	0.1						3,4,11	
		Test	0.1						11	
		Test			0.2					
		Replace	0.1						3,4,11	
		Repair					0.5			

## MAINTENANCE ALLOCATION CHART (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS
			C	O	F	H	D		
0201	Keysender and Oscillator Assembly	Replace Repair			0.5		2.0	11 3,4,6, 9 thru 17	
020101	Circuit Card Oscillator	Replace Repair			0.3		2.0	11 3,4,6, 9 thru 17	
03	TRUNK UNIT	Inspect	0.1						A G F C
		Test	0.1						
		Test			0.2			3,11	
		Replace		0.3				11	
		Repair		0.1		0.5		1,2	
		Repair						3,11	
0301	Panel Assembly	Replace Repair			0.2			11	
					1.0			11	
04	DISTRIBUTION BOX ASSEMBLY	Inspect	0.1						D
		Replace		0.2					
		Repair			0.5			18 9,10,11	

## Section III TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O,D	Lamp Extractor, WECO 553A	5120-00-293-1950	
2	O,D	Cap Extractor, Utica B-327	5120-00-293-1085	
3	F,D	Multimeter AN/USM-451	6625-01-060-6804	
4	F,D	Oscilloscope, AN/USM-281A	6625-00-228-2201	
5	F	Telephone Set, TA-341B/TT	5805-01-039-3499	
6	F,D	Attenuator, TS-402( )/U	6625-00-230-5149	
7	F,D	Extender Board, P/N 210099; FMC15412	5805-01-018-4193	
8	F,D	Card Puller, SMC-2016004	5805-00-431-0341	
9	F,D	Extraction Tool, 465199-1	5120-00-085-5092	
10	F,D	Crimping Tool, 90083	5102-00-954-8187	
11	F,D	Tool Kit, TK-105/G	5180-00-610-8177	
12	D	Oscillator, Audio, TS-421C/U	6625-00-669-0228	
13	D	Counter, Electronic, Digital Readout, AN/USM-459	6625-01-061-8928	
14	D	Power Supply, Hewlett Packard 6200B	4931-00-463-4638	
15	D	Wave Analyzer, Hewlett Packard HP3581A	6625-01-012-7669	
16	D	Voltmeter, Digital AN/USM-486		
17	D	Meter DBM/DBA; Consolidated Electrodynamics Model 11		
18	O	Tool Kit, TK-101/G	5180-00-064-5178	

## Section IV REMARKS

REFERENCE CODE	REMARKS
A	Verify operational performance.
B	General cleaning only.
C	Replace lamps, fuses and lightning arresters.
D	Replacement of chassis-mounted piece parts.
E	Replace circuit cards and chassis wiring and parts.
F	Replacement of 01 electronics units, or keycall pedestal, 03 trunk unit, 04 distribution box assembly by direct support personnel at organization site.
G	Direct support personnel will perform fault isolation on each individual component, 01, 02, 03 and 04 when part of total system at organization site.



## APPENDIX C

### COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

#### Section I INTRODUCTION

##### **C-1. SCOPE.**

This appendix lists components of end item and basic issue items for the CV-1918 converter to help you inventory items required for safe and efficient operation.

##### **C-2. GENERAL.**

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

- a. Section II, Components of End Item. This listing is for informational purposes only, and is not authorization to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.
- b. Section III, Basic Issue Items. These are the minimum essential items required to place the CV-1918 converter in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the CV-1918 converter during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

##### **C-3. EXPLANATION OF COLUMNS.**

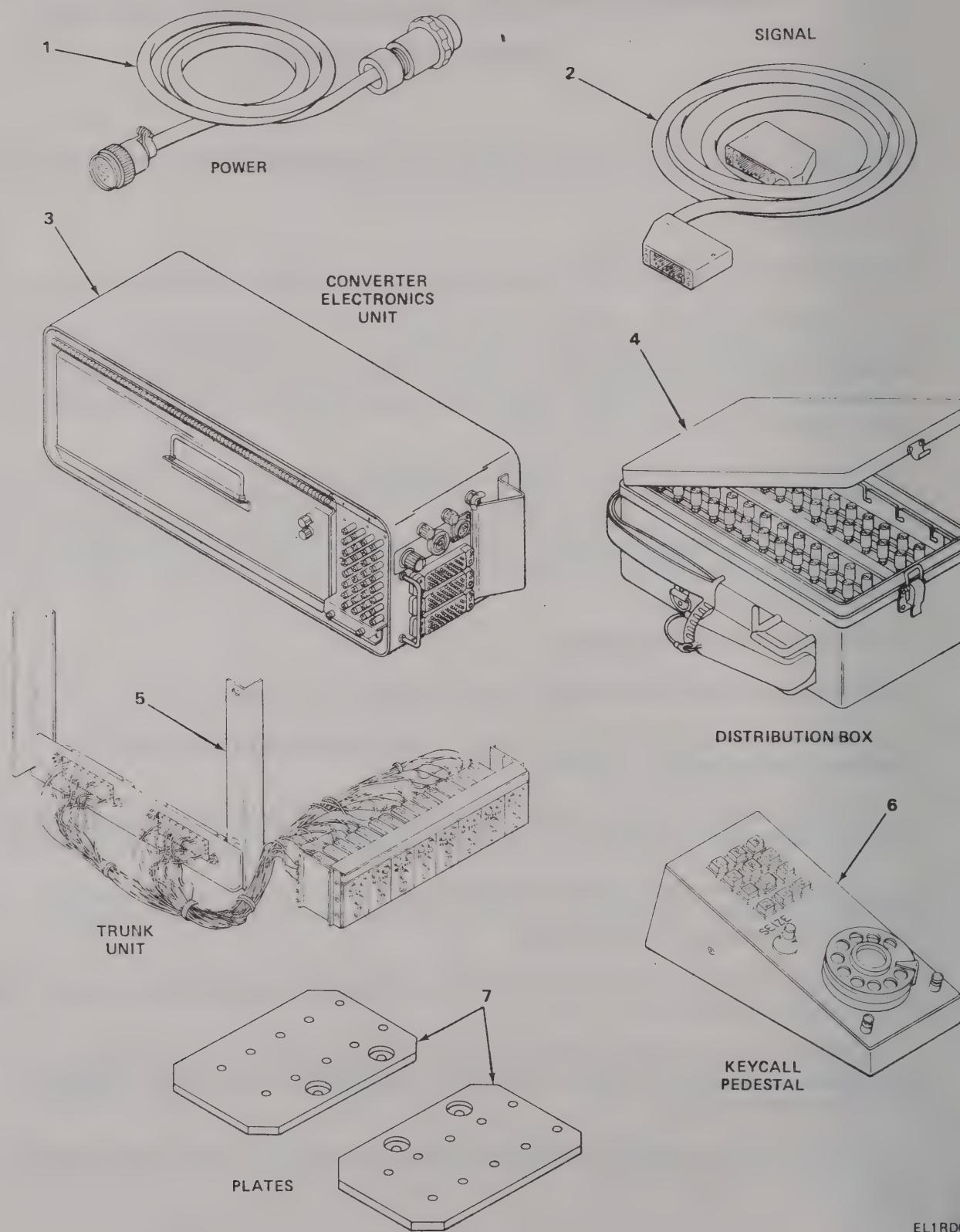
The following provides an explanation of columns found in the tabular listings:

- a. Column (1), Illustration Number (Illus No.). This column indicates the number of the illustration in which the item is shown.
- b. Column (2), National Stock Number. Indicates the National stock number assigned to the item. The national stock numbers in section III will be used for requisitioning basic issue items.
- c. Column (3), Description. Indicates the federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

If item needed differs for different models of this equipment, the model is shown under the "Usable On Code" heading in this column.

- d. Column (4), Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (eg, ea, in., pr).
- e. Column (5), Quantity Required (Qty Req'd). Indicates the quantity of the item authorized to be used with/on the equipment.

## Section II COMPONENTS OF END ITEM



## COMPONENTS OF END ITEM (CONT)

(1) ILLUS NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	(4) USABLE ON CODE	(4) U/M	(5) QTY REQ'D
	5805-00-504-9103	Converter, Telephone Signal CV-1918A (V)1/G consisting of:			
1		Cable Assembly, Power	ea	1	
2	5895-00-284-6353	Cable Assembly, Special- Purpose, Electrical CX-2584/U	ea	18	
3		Converter, Electronics Unit	ea	1	
4	6110-00-985-7574	Distribution Box J-1077 (*)/U	ea	1	
5		Trunk Unit	ea	9	
6		Keycall Pedestal Unit	ea	9	
7		Plates, Universal Mounting	ea	2	
	5805-00-504-9107	Converter, Telephone Signal CV-1918A (V) 2/G consisting of:			
1		Cable Assembly, Power	ea	1	
2	5895-00-284-6353	Cable Assembly, Special- Purpose, Electrical CX-2584/U	ea	6	
3		Converter, Electronics Unit	ea	1	
4	6100-00-985-7574	Distribution Box J-1077(*)/U	ea	1	
5		Trunk Unit	ea	3	
6		Keycall Pedestal Unit	ea	3	
7		Plates, Universal Mounting	ea	2	
	5805-00-137-7674	Converter, Telephone Signal CV-1918A (V) 3/G consisting of:			
1		Cable Assembly, Power	ea	1	
2	5895-00-284-6353	Cable Assembly, Special- Purpose, Electrical CX-2584/U	ea	4	

## COMPONENTS OF END ITEM (CONT)

(1) ILLUS NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	USABLE ON CODE	(4) U/M	(5) QT REC
3		Converter, Electronics Unit		ea	1
4	6110-00-985-7574	Distribution Box J-1077(*)/U		ea	1
5		Trunk Unit		ea	2
6		Keycall Pedestal Unit		ea	2
7		Plates, Universal Mounting		ea	2

## Section III BASIC ISSUE ITEMS

There are no basic issue items authorized for the CV-1918 telephone signal converter.

## APPENDIX E

### EXPENDABLE SUPPLIES AND MATERIALS LIST

#### Section I INTRODUCTION

##### **E-1. SCOPE.**

This appendix lists expendable supplies and materials you will need to operate and maintain the CV-1918 converter. These items are authorized to you by CTA 50-970, Expendable Items (except medical, class V, repair parts, and heraldic items).

##### **E-2. EXPLANATION OF COLUMNS.**

- a. Column (1), Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (eg, use cleaning compound, item 1, appendix E).
- b. Column (2), Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

O - Organizational

F - Direct Support

H - General Support

- c. Column (3), National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.
- d. Column (4), Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses, followed by the part number.
- e. Column (5), Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (eg, ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

#### Section II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION (FSCM)	(5) U/M
1	C	6850-00-105-3084	TRICHLOROTRIFLUOROETHANE (Cleaning Compound, FREON PCA)	
2	C	8305-00-222-2423	Cloth, Cotton (Cheesecloth) (CCC-C-440E-81348)	pt
3	C	5350-00-598-5908	Sandpaper, No. 000	yd sh



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## SOMETHING WRONG WITH THIS PUBLICATION?



THEN, JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

Commander  
Stateside Army Depot  
ATTN: AMSTA-US  
Stateside, N.J. 07703

DATE SENT

10 July 1975

PUBLICATION NUMBER

TM 11-5840-340-12

PUBLICATION DATE

23 Jan 74

PUBLICATION TITLE

Radar Set AN/PRC-76

BE EXACT PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG  
AND WHAT SHOULD BE DONE ABOUT IT:

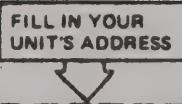
PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	
2-25	2-28			<p>Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°.</p> <p>REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.</p>
3-10	3-3	3-1		<p>Item 5, Function column. Change "2 db" to "3db."</p> <p>REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.</p>
5-6	5-8			<p>Add new step f.1 to read, "Replace cover plate removed in step e.1, above."</p> <p>REASON: To replace the cover plate.</p>
	FO3			<p>Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."</p> <p>REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.</p>

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SSG I. M. DeSpiritof 999-1776

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SAMPLE



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TM 11-5805-553-13/EE165-BB-OMI-010/  
E154CV1918.A

PUBLICATION DATE

5 Mar 84

PUBLICATION TITLE

CONVERTER, TELEPHONE SIGNAL  
(NSN 5805-00-504-9103)

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**DA FORM 1 JUL 79 2028-2**

PREVIOUS EDITIONS  
ARE OBSOLETE

PS--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR  
RECOMMENDATION MAKE A CARBON COPY OF THIS  
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By Order of the Secretaries of the Army and the Navy:

Official:

JOHN A. WICKHAM JR.  
*General, United States Army*  
*Chief of Staff*

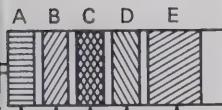
ROBERT M. JOYCE  
*Major General, United States Army*  
*The Adjutant General*

G. B. SCHICK, JR.  
*Rear Admiral, United States Navy*  
*Commander, Naval Electronic*  
*Systems Command*

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Operator's Maintenance requirements for CV-1918/G.





CY AND CB.

CHARACTERISTIC		DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
CN	CB	CM	CY, CM	CM
A			-55° TO +70°C	10 - 55 Hz
E	B			
			-55° TO +85°C	
	D	300		
			-55° TO +125°C	10 - 2,000 Hz
		500		
			-55° TO +150°C	

BAND

CE	CE	FAIL
CE	COLOR	FAIL
BROWN ....	M =	
RED .....	P =	
ORANGE ...	R =	
YELLOW ...	S =	
WHITE ....	...	

TO	ED	TY).	ERANCE	MIL ID
TO	ED	TY).	ACITANCES	MIL ID
			2.0 UUF	CC
			0.25 UUF	
			0.1 UUF	
			0.05 UUF	
			0.025 UUF	
			0.01 UUF	
			0.005 UUF	
			0.0025 UUF	
			0.001 UUF	
			0.0005 UUF	
			0.00025 UUF	
			0.0001 UUF	
			0.00005 UUF	

3. ORANGE	1.0 UUF
2.5 UUF	
1.0 UUF	
0.5 UUF	
0.25 UUF	
0.1 UUF	
0.05 UUF	
0.025 UUF	
0.01 UUF	
0.005 UUF	
0.0025 UUF	
0.001 UUF	
0.0005 UUF	
0.00025 UUF	
0.0001 UUF	

1. THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.
2. LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS: MIL-C-5, MIL-C-25D, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.
3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.
4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE.

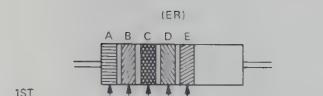
\* OPTIONAL CODING WHERE METALLIC PIGMENTS ARE UNDESIRABLE.

FO 1  
EL1RD055

Military Standard Color-Code Marking

FO-1/(FO-2 blank)





COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS.



COLOR-CODE MARKING FOR FILM-TYPE RESISTORS

BAND A		BAND B		BAND C		BAND D		BAND E	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL TERM.
BLACK	0	BLACK	0	BLACK	1	BROWN	±10 (COMP. TYPE ONLY*)	BROWN	M = 1.0
BROWN	1	BROWN	1	BROWN	10	RED	±5	RED	P = 0.1
RED	2	RED	2	RED	100	ORANGE	±2 (NOT APPLICABLE TO ESTABLISHED RELIABILITY)	ORANGE	R = 0.01
ORANGE	3	ORANGE	3	ORANGE	1,000	YELLOW	S = 0.001	YELLOW	S = 0.001
YELLOW	4	YELLOW	4	YELLOW	10,000	GREEN			
GREEN	5	GREEN	5	GREEN	100,000	BLUE			
BLUE	6	BLUE	6	BLUE	1,000,000	VIOLET			
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7	PURPLE (VIOLET)		GRAY			
GRAY	8	GRAY	8	GRAY		WHITE			
WHITE	9	WHITE	9	WHITE		SILVER		SILVER	
								GOLD	DECIMAL POINT

BAND A - THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH).

BAND B - THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C - THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL VALUE.)

BAND D - THE RESISTANCE TOLERANCE.

BAND E - WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE RATE LEVEL (PERCENT FAILURE PER 1,000 HOURS). ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1 1/2 TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

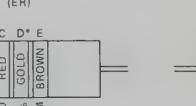
RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS (THESE ARE NOT COLOR CODED)

SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHANUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS

10R0 = 10.0 OHMS

FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED; IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.



(ER)

3 9 100 5%

X100

±5%

M

WHITE

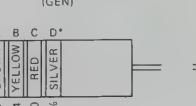
RED

GOLD

BROWN

D\*

E



(GEN)

1 4 100 10%

X100

±10%

S

M

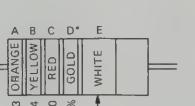
A

B

C

D\*

E



(GEN)

3 4 100 5%

X100

±5%

S

M

A

B

C

D\*

E

WHITE

RED

GOLD

BROWN

D\*

E

S

\*IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

S

M

A

B

C

D\*

E

S

\*IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.

TABLE 2

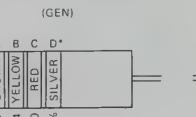
COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKES COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

EXAMPLES OF COLOR CODING



(ER)

3 9 100 5%

X100

±5%

M

WHITE

RED

GOLD

BROWN

D\*

E

S

\*IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

\*IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

TABLE 2

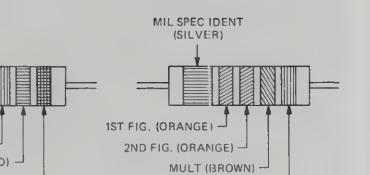
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GRAY	8		
WHITE	9		

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKES COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

\*IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.



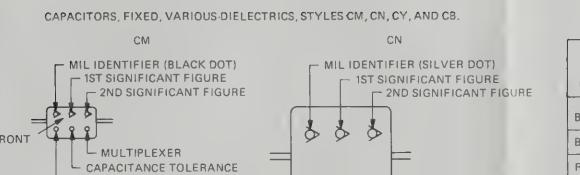
(A) 8.2UH ±10%

1ST FIG. (GRAY)  
DECIMAL (GOLD)  
2ND FIG. (RED)  
TOLERANCE (SILVER)1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT (BROWN)  
TOLERANCE (GOLD)

(B) 220 UH ±5%

1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT (BROWN)  
TOLERANCE (GOLD)

COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF THE CODING FOR AN 8.2UH CHOKES IS GIVEN. AT B, THE COLOR BANDS FOR A 330 UH INDUCTOR ARE ILLUSTRATED.



(A) 8.2UH ±10%

1ST FIG. (GRAY)  
DECIMAL (GOLD)  
2ND FIG. (RED)  
TOLERANCE (SILVER)1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT (BROWN)  
TOLERANCE (GOLD)

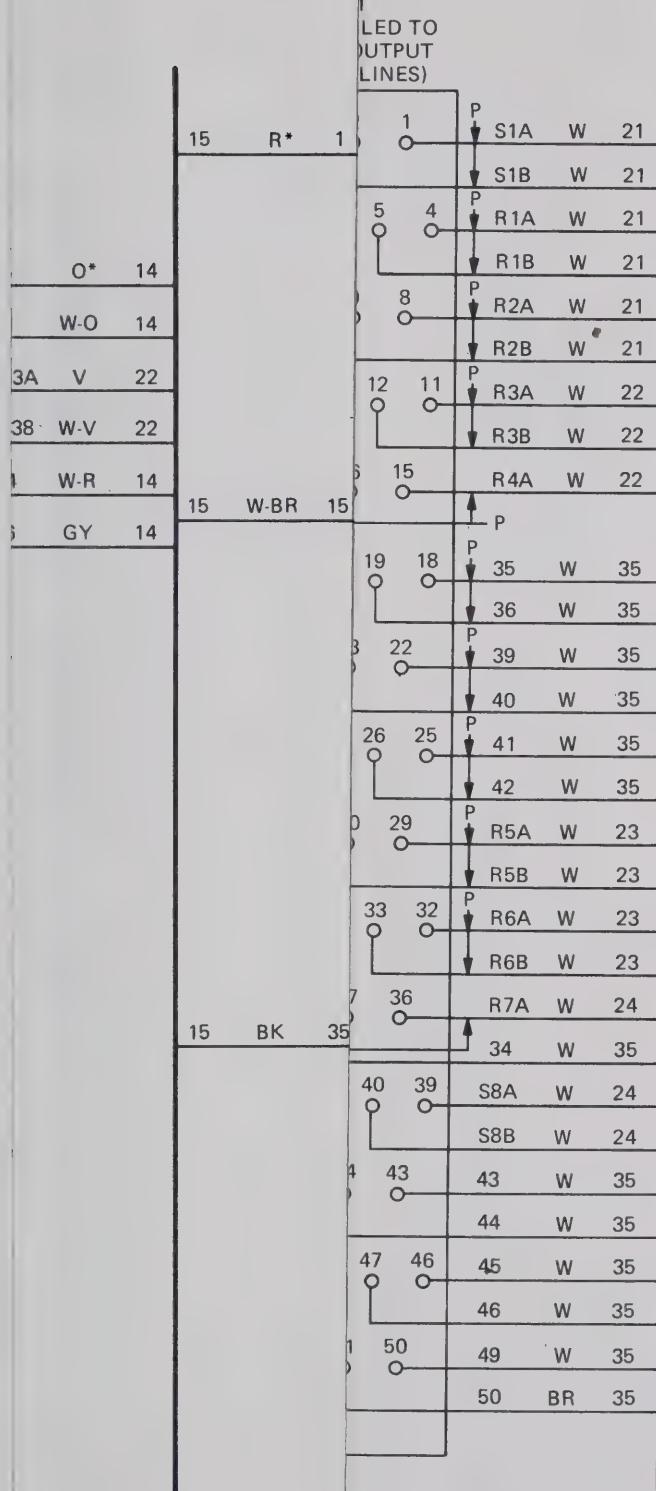
(B) 220 UH ±5%

1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT (BROWN)  
TOLERANCE (GOLD)

COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF THE CODING FOR AN 8.2UH CHOKES IS GIVEN. AT B, THE COLOR BANDS FOR A 330 UH INDUCTOR ARE ILLUSTRATED.

1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT (BROWN)  
TOLERANCE (GOLD)1ST FIG. (ORANGE)  
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MULT (BROWN)  
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TOLERANCE (GOLD)1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT (BROWN)  
TOLERANCE (GOLD)1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT (BROWN)  
TOLERANCE (GOLD)1ST FIG. (ORANGE)  
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TOLERANCE (GOLD)1ST FIG. (ORANGE)  
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TOLERANCE (GOLD)1ST FIG. (ORANGE)  
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TOLERANCE (GOLD)1ST FIG. (ORANGE)  
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TOLERANCE (GOLD)1ST FIG. (ORANGE)  
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MULT (BROWN)  
TOLERANCE (GOLD)1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT (BROWN)  
TOLERANCE (GOLD)1ST FIG. (ORANGE)  
2ND FIG. (ORANGE)  
MULT

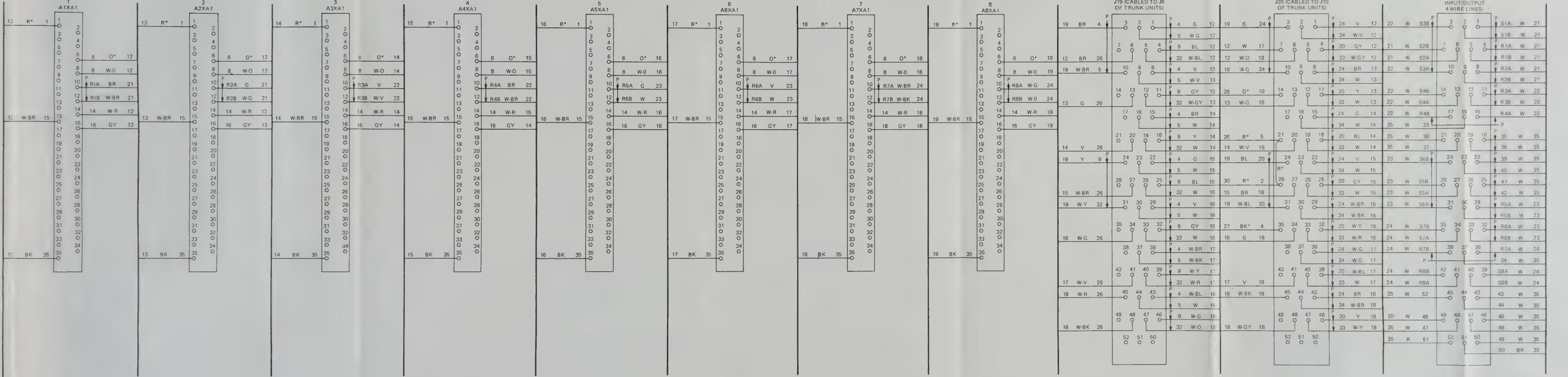




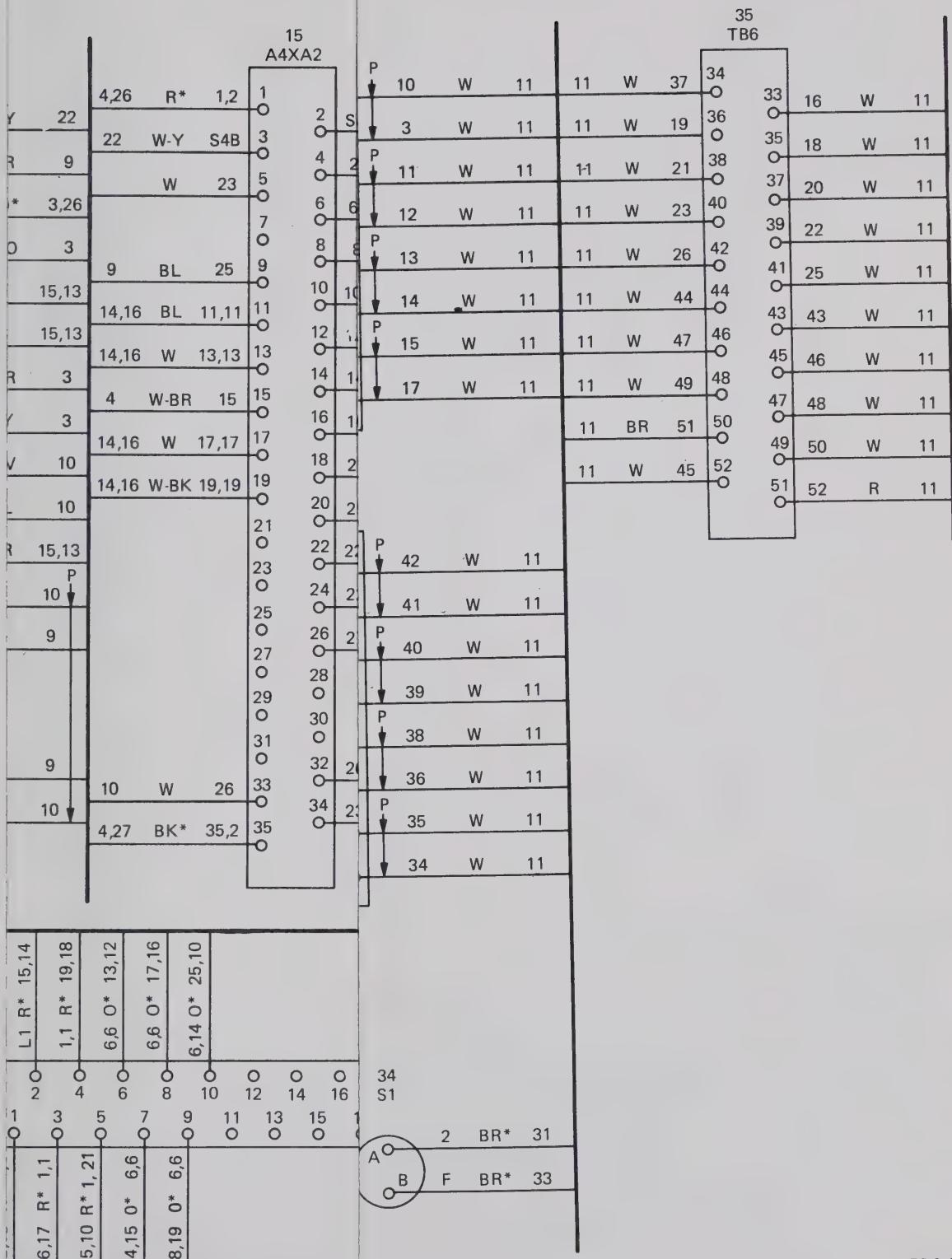
FO 2, SH 1  
EL1RD056

tronics Unit, Wiring Diagram (Sheet 1 of 2)

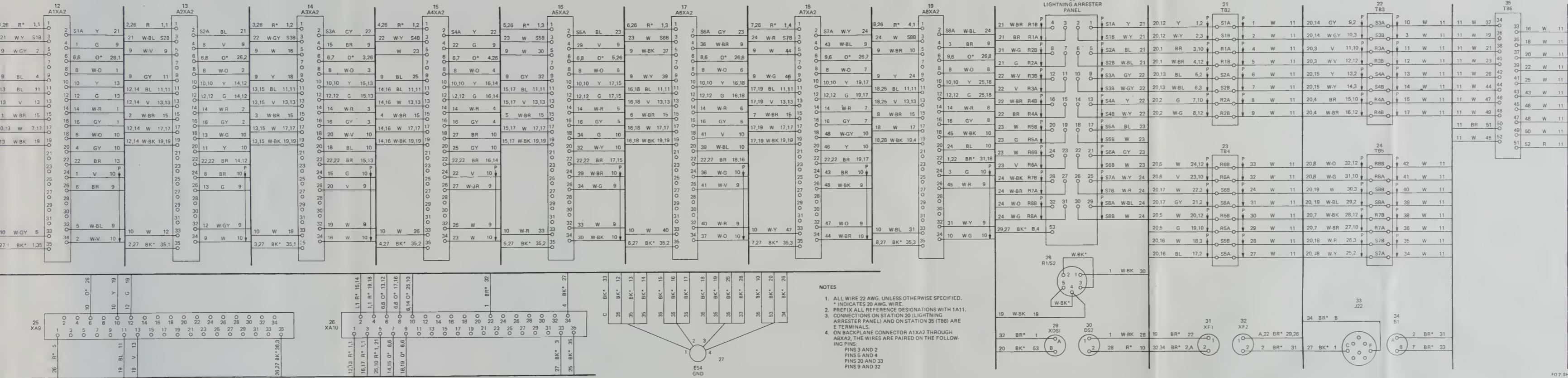




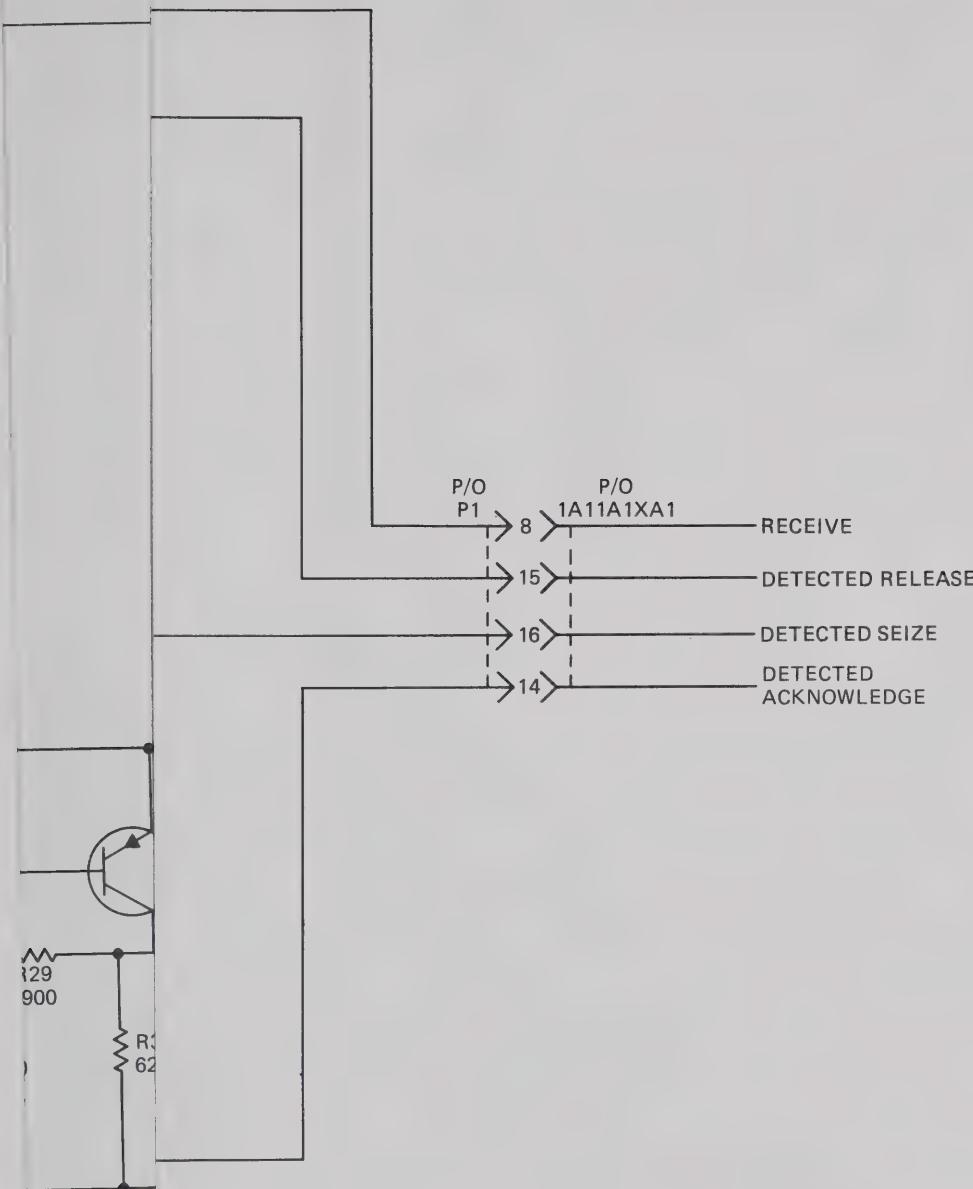






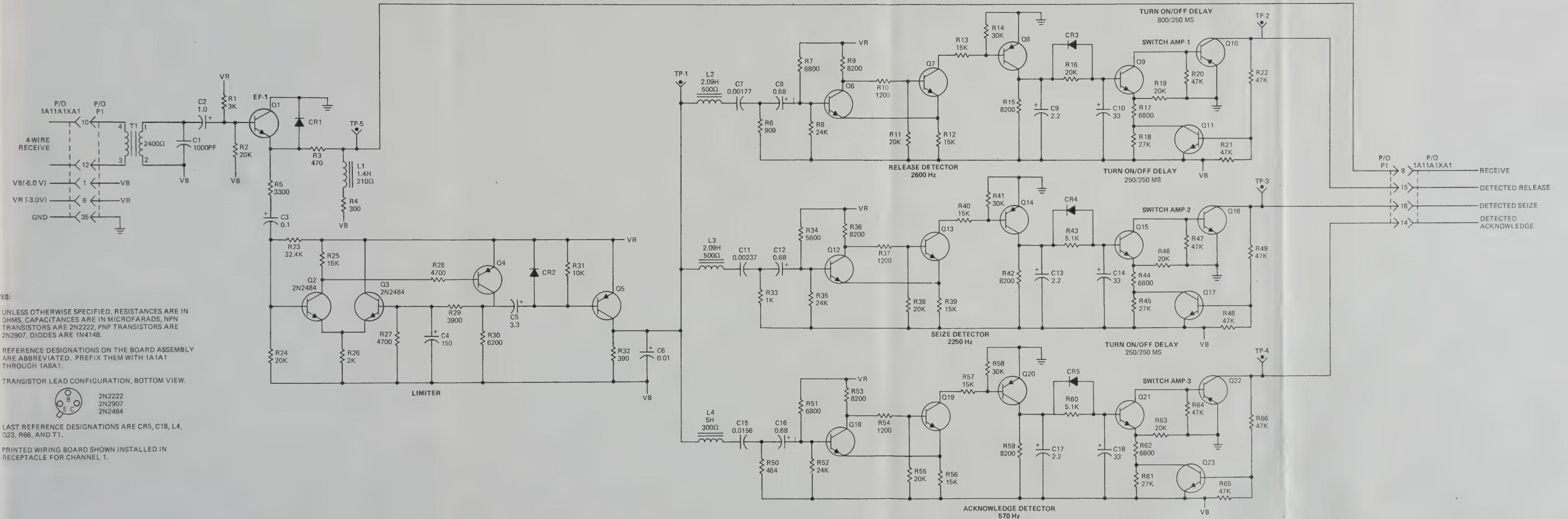




FO 3  
EL1RD057

D-3. Analog Printed Wiring Board, Schematic Diagram





### 4-3. Analog Printed Wiring Board, Schematic Diagram



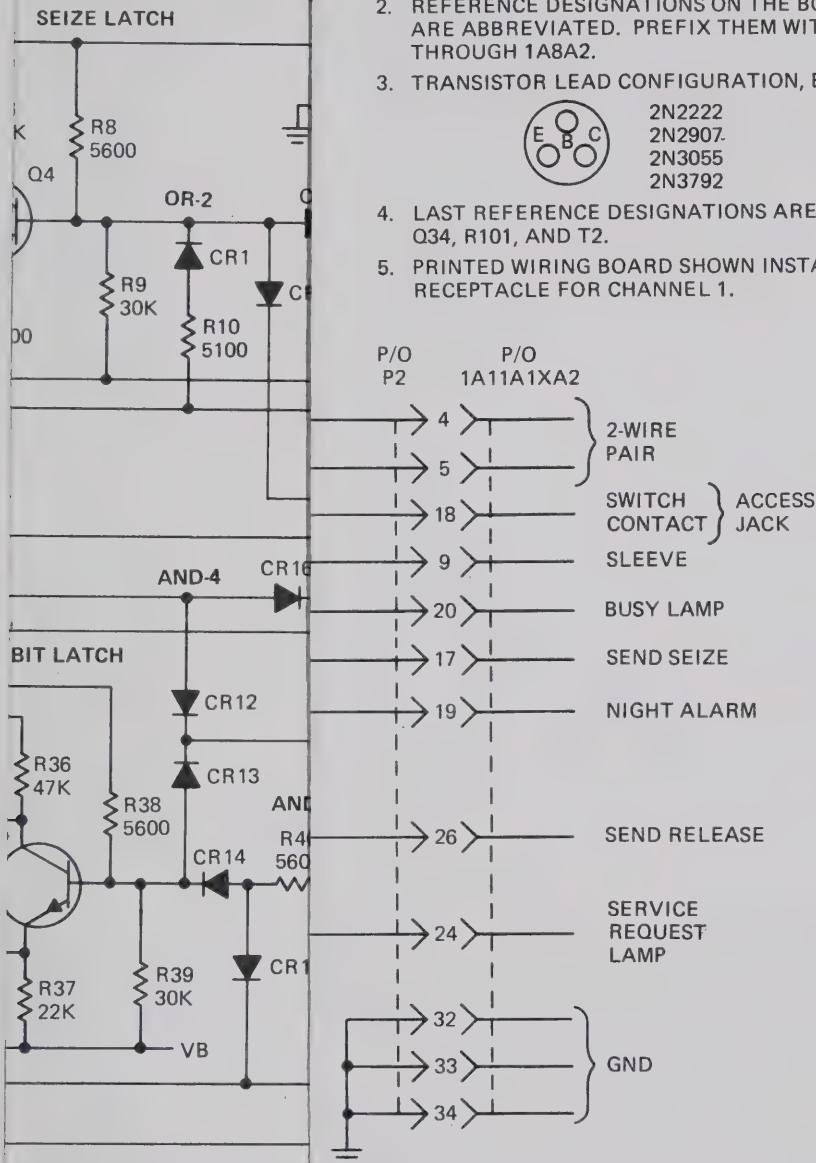
## NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, NPN TRANSISTORS ARE 2N2222, PNP TRANSISTORS ARE 2N2907, DIODES ARE 1N4148.
2. REFERENCE DESIGNATIONS ON THE BOARD ASSEMBLY ARE ABBREVIATED. PREFIX THEM WITH 1A1A2 THROUGH 1A8A2.
3. TRANSISTOR LEAD CONFIGURATION, BOTTOM VIEW.



2N2222  
2N2907  
2N3055  
2N3792

4. LAST REFERENCE DESIGNATIONS ARE CR29, C15, L1, Q34, R101, AND T2.
5. PRINTED WIRING BOARD SHOWN INSTALLED IN RECEPTACLE FOR CHANNEL 1.

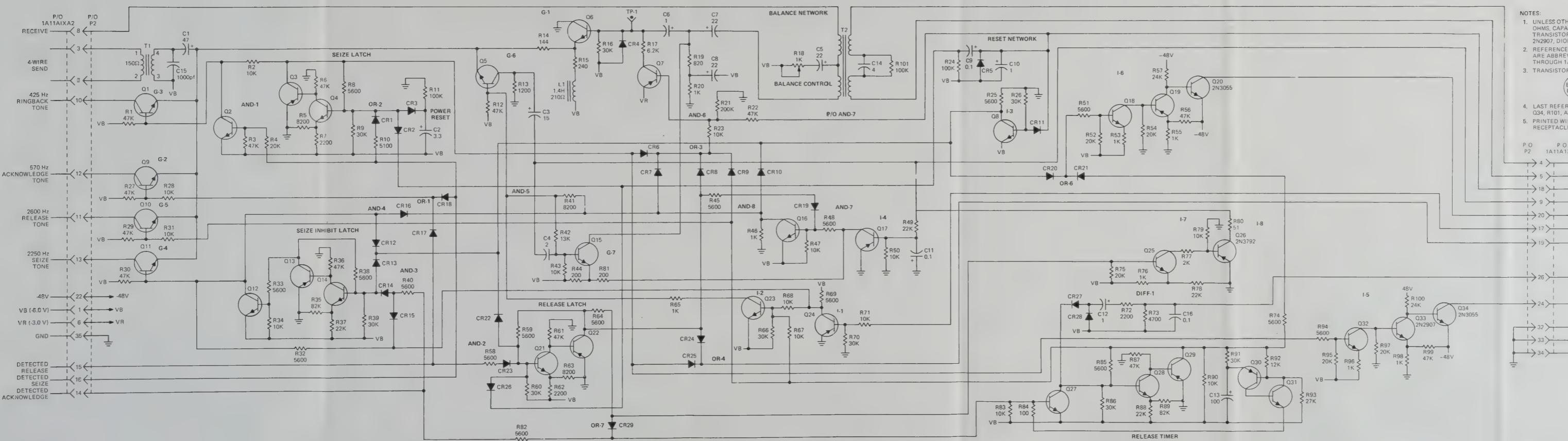


FO 4  
EL1RD058

inted Wiring Board, Schematic Diagram

FO-9/(FO-10 blank)





WISE SPECIFIED, RESISTANCES ARE IN  
ANCES ARE IN MICROFARADS, NPN  
RE 2N2222, PNP TRANSISTORS ARE  
ARE 1N4148.

SIGNATIONS ON THE BOARD ASSEMBLY  
TED. PREFIX THEM WITH 1A1A2  
2

AD CONFIGURATION, BOTTOM VIEW  
2N2222  
2N2907

2N2305  
2N3055  
2N3792

ING BOARD SHOWN INSTALLED IN  
CHANNEL 1

### 2-WIRE

PAIR }  
SWITCH } ACCESS  
CONTACT } JACK

CONTACT JACK  
SLEEVE

BUSY LAMP  
SEND SEIZE

## NIGHT ALARM

SEND RELEASE

SEND RELEASE

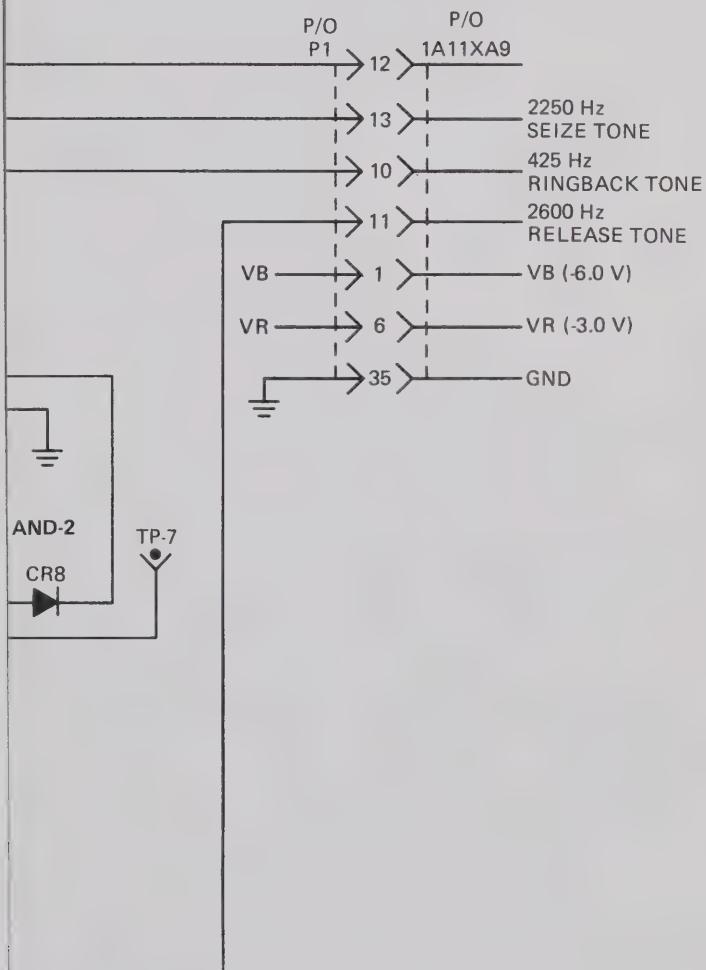
SERVICE  
REQUEST  
LAMP

## Printed Wiring Board, Schematic Diagram



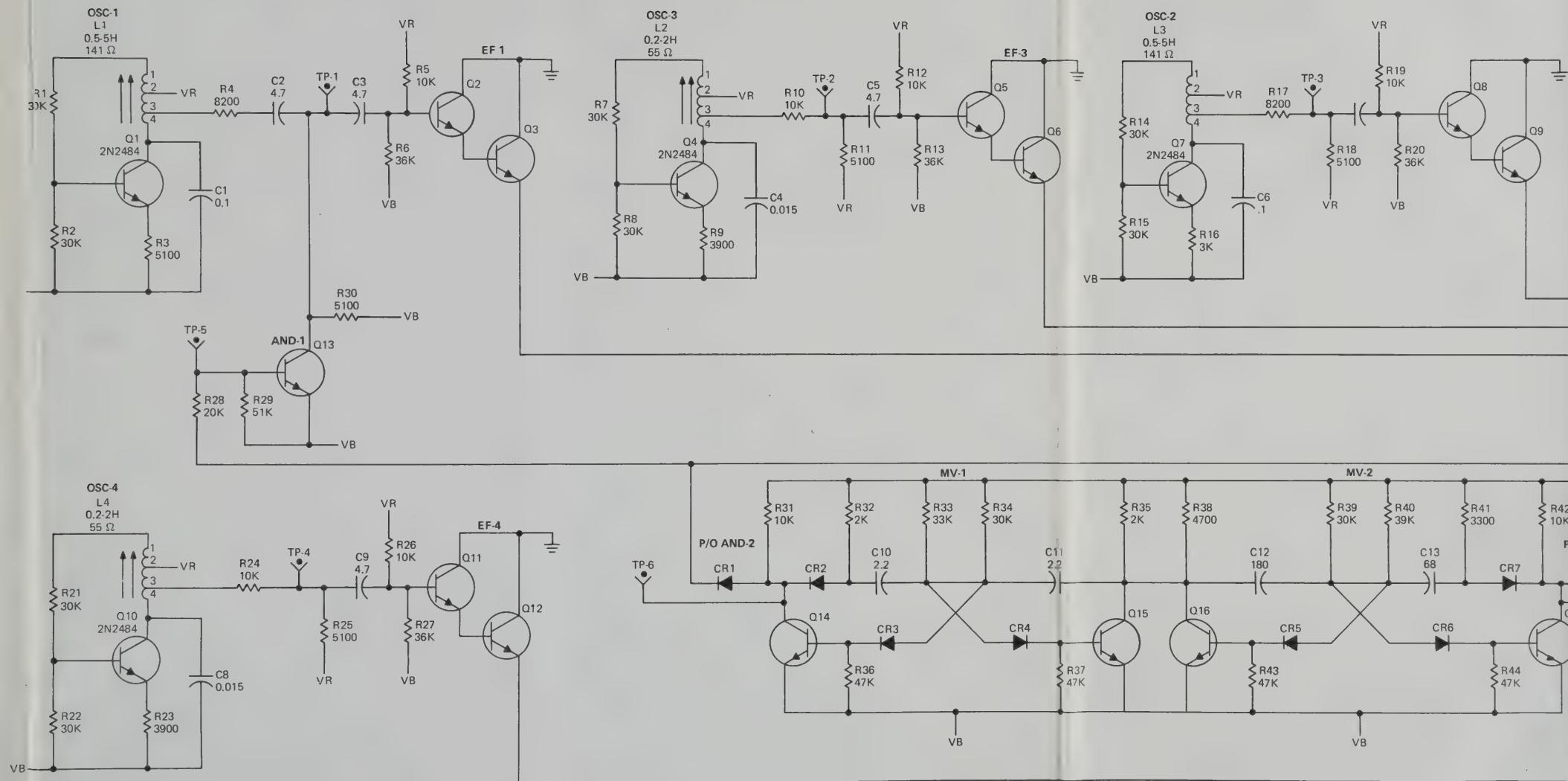
## NOTES:

1. UNLESS OTHERWISE NOTED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, NPN TRANSISTORS ARE 2N2222, PNP TRANSISTORS ARE 2N2907, DIODES ARE 1N4148.
2. REFERENCE DESIGNATIONS ON THE BOARD ASSEMBLY ARE ABBREVIATED, PREFIX THEM WITH 1A9.
3. TRANSISTOR LEAD CONFIGURATION, BOTTOM VIEW,  
  
 2N2222  
 2N2907  
 2N2484
4. LAST REFERENCE DESIGNATIONS ARE CR8, C13, L4, Q17, AND R44.

FO 5  
EL1RD059

Printed Wiring Board, Schematic Diagram



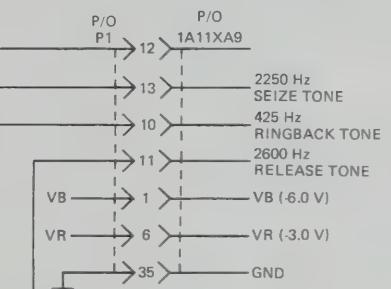
**NOTES:**

1. UNLESS OTHERWISE NOTED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, NPN TRANSISTORS ARE 2N2222, PNP TRANSISTORS ARE 2N2907, DIODES ARE 1N4148.

2. REFERENCE DESIGNATIONS ON THE BOARD ASSEMBLY ARE ABBREVIATED, PREFIX THEM WITH 1A9.

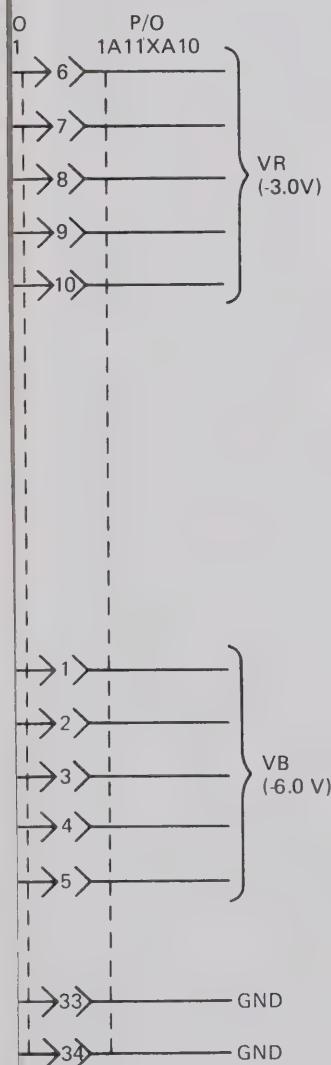
3. TRANSISTOR LEAD CONFIGURATION, BOTTOM VIEW,  
2N2222  
2N2907  
2N2484

4. LAST REFERENCE DESIGNATIONS ARE CR8, C13, L4,  
Q17, AND R44.



FO-5. Tone Generator Printed Wiring Board, Schematic Diagram





Wiring Board, Schematic Diagram

FO 6  
EL1RD060



## NOTES:

1. UNLESS OTHERWISE NOTED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS, NPN TRANSISTORS ARE 2N2222, PNP TRANSISTORS ARE 2N2907, DIODES ARE IN4148.

2. REFERENCE DESIGNATIONS ON THE BOARD ASSEMBLY ARE ABBREVIATED, PREFIX THEM WITH 1A10.

3. TRANSISTOR LEAD CONFIGURATION, BOTTOM VIEW.



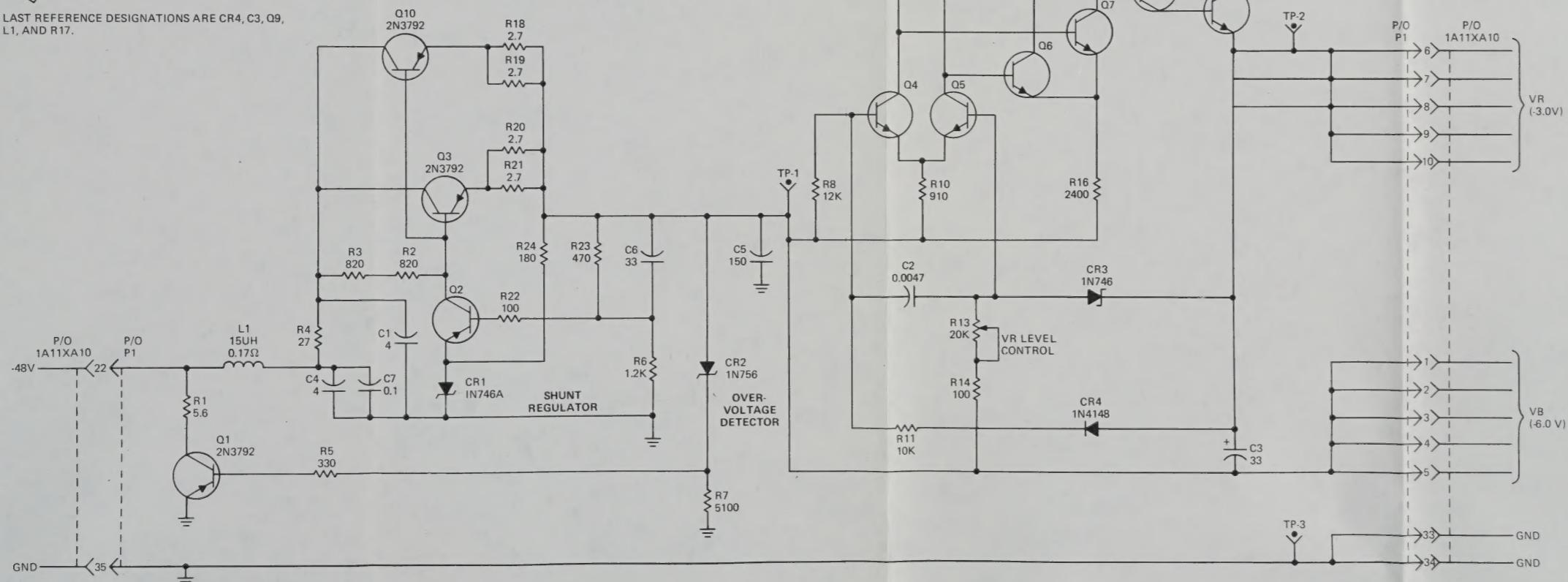
2N2222

2N2907

2N2219

2N3792

4. LAST REFERENCE DESIGNATIONS ARE CR4, C3, Q9, L1, AND R17.



FO-6. Common Printed Wiring Board, Schematic Diagram





